Tree Farm Licence 3
Slocan Forest Products

Documentation of Analysis for Vegetation Resources Inventory Statistical Adjustment

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EXECUTIVE SUMMARY

Ninety VRI Phase II ground samples were established in TFL 3 in the 2001 field season, based on the PPSWR sample design specified in the VRI Project Implementation Plan (VPIP). The population of interest for this study was vegetated, treed polygons with inventory age greater than 20 years. TheVRI data was analyzed to provide statistical adjustment factors that could be used to support a timber supply analysis. The adjustment factors were developed using the interim "Fraser Protocol" according to current MSRM standards. Age, height and volume adjustment ratios were provided for each of four leading-species based strata that corresponded with the sample design pre-stratification. For the balsam leading stratum, an age-related bias was observed in the adjusted volumes. To correct for this bias, the balsam leading stratum was sub-stratified using a 120 year age break. Ground volumes were compiled using loss factors and net factoring. However, NVAF sampling was not carried out in this unit hence the net factored volumes could not be adjusted for taper and hidden decay. The overall ratio of ground loss factor volume to unadjusted inventory volume was 0.88. This was similar to the ratio of 0.87 that was observed in the Inventory Audit for TFL 3 (note that the audit population of interest for the audit was slightly different). The sampling error for the VRI loss factor ratio of 0.88 was 11.8% at a 95% confidence level. This was slightly higher than the target sampling error of 10% that was set in the VPIP.

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1. INTRODUCTION

1.1 Background

A VRI Project Implementation Plan (VPIP), prepared by Ministry of Forests-Nelson Forest Region in consultation with Slocan Forest Products and Resources Inventory Branch (RIB), outlined ground sampling activities for the timber emphasis Vegetation Resources Inventory (VRI) ground sampling in TFL 3[1]. The timber emphasis VRI was, in part, motivated by the results of the 1995 Inventory Audit for TFL 3 that suggested an overestimation in inventory height for stands over 60 years of age. Although the TFL 3 inventory recently underwent a VRI retrofit[2], the issue of height overestimation has not been addressed. The rationale for the VPIP was that ground sampling and a statistical adjustment of the inventory would correct for any observed bias in the inventory. According to the VPIP, the main objective of the timber emphasis inventory was to:

> *"Install an adequate number of VRI sample clusters to adjust the timber emphasis inventory in the TFL 3 Vegetated Treed (VT) areas greater than 20 years of age, to achieve a sampling error of ±10% (95% probability) for overall net timber volume."*

Samples were selected using probability proportional to size with replacement (PPSWR). Ninety VRI Phase II ground samples were established in the 2001 field season. Sampling to determine a Net Volume Adjustment Factor (NVAF) for this unit was not carried out. For further details regarding the ground sampling, please refer to the VPIP document.

1.2 Scope and Objectives

The objective of this analysis was to analyze the VRI ground sample data and provide statistical adjustment factors for TFL 3 based in the current Ministry of Sustainable Resource Management (MSRM) methodological standards. The actual adjustment of the inventory file is not within the scope of this contract and will be completed under separate contract by Timberline Forest Inventory Consultants Ltd.

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[1] "Tree Farm Licence 3 Slocan Forest Products: Timber Emphasis VRI Ground Sampling Project Implementation Plan", April 27, 2001, Ministry of Forests, Nelson Forest Region.

[2] In the retrofit process, FIP files are converted to VIF file formats and missing VRI attributes are photo-estimated. However, no new polygon delineation is completed and the original photo-interpreted attributes are not changed.

2. METHODS

2.1 Overview of statistical adjustment

Statistical adjustment is the process of adjusting the values of the photo-interpreted variables in the inventory using information from the ground sampling observations. The statistical adjustment factors for TFL 3 were developed using the current MSRM approach known as the "Fraser Protocol".

In the Fraser Protocol, ground observations are compared with photo-estimated values[3] for each sampled polygon. A statistical model, typically ratio of means[4], is then used to develop the adjustment factors. These factors are applied to all polygons in the photo-interpreted inventory database to produce the final adjusted inventory database. Under the current MSRM standard, only three inventory attributes are adjusted: age, height and volume. The Fraser Protocol is a sequential approach where adjustment factors for inventory age and height are computed first, a new "attribute-adjusted" inventory volume (based on the adjusted age and height) is calculated next, and finally, a volume adjustment factor is computed based on the "attribute-adjusted" inventory volume. This process is shown diagrammatically in Figure 1 below.

[3] In VRI terminology, the ground sample values are referred to as PHASE II values and the photo-interpreted inventory values are referred to as PHASE I values.

[4] Ratio-of-means is generally appropriate if the relationship between **y** (ground attribute, in this case) and **x** (inventory attribute) is linear and passes through the origin. If these conditions are not met alternative adjustment approaches (such as linear regression, geometric mean regression, non-linear regression) may be explored. However, these alternatives also have their limitations and may produce undesirable characteristics in the adjusted population.

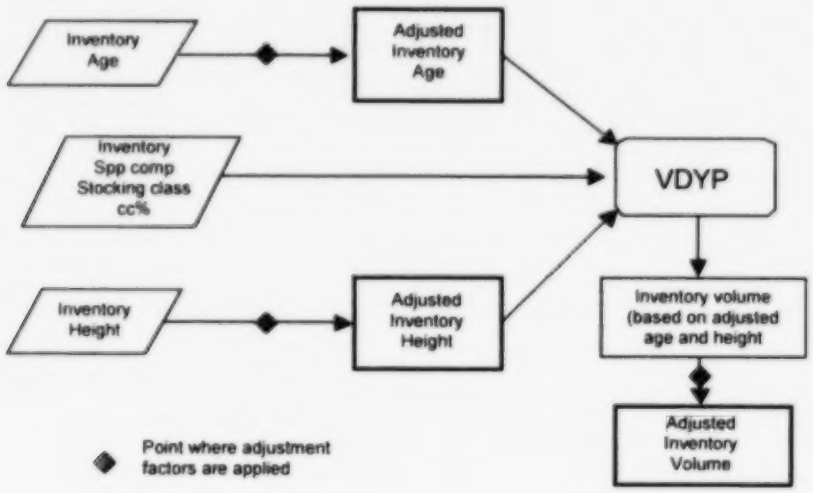

Figure 1: Overview of the Fraser Protocol for statistical adjustment of inventories.

2.2 Population for adjustment

The population of interest for TFL 3 was defined as vegetated, treed[5] (VT) polygons greater than 20 years of age on the inventory file. The adjustment factors apply to all polygons in the inventory meeting these criteria.

2.3 Data sources

2.3.1 Phase I photo-interpreted inventory data

The TFL 3 inventory data was provided by MSRM in Vegetation Inventory File (VIF) format. The TFL 3 inventory was "retrofit", that is, the existing inventory in FIP (Forest Inventory Planning) format was translated into VIF format and additional attributes required by VRI were re-estimated from the aerial photos. No new polygon delineation or re-estimation of existing attributes was carried out. With the exception noted in section 2.4 below, inventory data used in the adjustment was based on the rank 1 layer. Inventory data was projected to 2001 to correspond with the year of ground sampling.

[5] VT as defined by the BC Land Classification System.

2.3.2 Phase II ground sample data

All 90 of the originally planned VRI ground samples were established in the 2001 field season. The samples were validated and the data compiled by MSRM. The final compiled data was provided for analysis on November 15, 2001. Net timber volumes were compiled using the 1976 Ministry of Forests Forest Inventory Zone Decay, Waste and Breakage factors to estimate decay, waste and breakage. In addition, volumes were also compiled using the standard VRI call grading/net factoring. However since there was no NVAF sampling carried out in this unit, the net factored volumes were not adjusted with an NVAF.

2.3.3 Data matching

For each VRI sample polygon, the ground sample data was matched with the corresponding inventory data for the same polygon. The ground and inventory data used in the development of the adjustment factors for TFL 3 are provided in Appendix A.

The ground heights and ages used in the adjustment were based on the average values for the T, S & L[6] trees for the leading species (by basal area at 4cm + dbh utilization) on the ground. In the Vegetation Inventory File (VIF) format, inventory data (i.e. height and age) is available for the leading and second species. The objective in the matching process was to choose an inventory height and age (i.e. for either the leading or second species) so that the ground and inventory species "matched". If a match could not be made at the sp0[7] level, conifer-to-conifer matches were allowed. However, conifer-deciduous matches were not considered acceptable. Details of the species matching process are provided in the VRI Draft Attribute Adjustment Procedures document available from the MSRM. Note that where second species inventory ages and heights were required[8], these attributes were projected to 2001 using Sitetools.

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[6] T or "top height" tree is the largest DBH in 0.01 ha plot, regardless of species; L or "leading species" tree is the largest DBH in 0.01 ha plot, of leading species; S or "second species" is the largest DBH in 0.01 ha plot, of second species. T and S trees are selected and measured at the IPC only whereas L trees are selected at the IPC and all auxiliary plots. For details, refer to Section 4.8 in the MSRM document "VRI Ground Sampling Procedures", January 2001 version 4.2.

[7] sp0 refers to the 16 major species codes and is roughly equivalent to the genus level.

[8] For 50% of the samples, the inventory and ground leading species matched. For a further 28.5% of the samples, the ground leading species matched the inventory second species. The remaining 21.5% of the samples were matched based on conifer-to-conifer.

2.4 Data issues related to the analysis

Two samples were excluded from the analysis since they were outside of the population of interest (i.e. they were less than 20 years of age) and had been established inadvertently[9]. Sample #13 was identified as a potential "outlier" based on a large discrepancy between the observed ground age and the inventory age. Further examination of this sample indicated that the ground plots appeared to have captured the rank 2 layer in this polygon. Although adjustment is normally based on the rank 1 layer, an exception was permitted in this case[10] and the rank 2 age and height data for this polygon were used in the development of the height and age ratios. Note, however, that the adjustments were subsequently applied to the rank 1 layer and the "attribute-adjusted" volume was computed based on the rank 1 layer. The volume adjustment factors were developed based on the rank 1 "attribute-adjusted" volume.

2.5 Pre-stratification and sub-stratification

Polygons were selected for sampling using PPSWR (probability proportional to size with replacement) methodology. Prior to sample selection, the population was pre-stratified based on inventory leading species into four strata:

- Polygons leading in Douglas-fir, pine, larch or deciduous
- Polygons leading in spruce
- Polygons leading in hemlock or cedar
- Polygons leading in balsam.

The analysis and the development of the adjustment factors maintained the sampling pre-stratification. In addition, further sub-stratification based on age groupings was investigated in all strata. These results are presented in the sections that follow.

2.6 PPSWR formulae used to compute adjustment ratios and sampling error

When analyzing the data it is important that the formulae used to derive the adjustment factors correspond with the sample design. Details on the appropriate adjustment methodology for the PPSWR sample design can be found in the document "The Statistical Estimation and Adjustment

[9] Samples #54 and #110 were excluded from the analysis since they were less than 20 years of age on the inventory.

[10] As per instructions from Dr. Sam Otukol, MSRM Mensurationist (e-mail December 19, 2001).

Process using a PPSWR Sampling Design in the Vegetation Resource Inventory"[11]. The formulae applied in this analysis were provided by Dr. Peter Ott[12] and are shown in Appendix B.

3. RESULTS AND DISCUSSION

3.1 Age and height adjustment

Ground ages and/or heights were missing for three samples. Hence 85 samples were available for the development of the age and height adjustment factors. As shown in Appendix B, the PPSWR formula[13] for computation of the adjustment ratio of means in each stratum can be simplified to the following:

$$\hat{R}_h = \frac{\bar{y}_h}{\bar{x}_h} \qquad [1]$$

where $\bar{y}_h$ is the mean ground height (or age) in stratum h and $\bar{x}_h$ is the mean inventory height (or age) in stratum h.

This formula was used to compute the adjustment ratios for height and age shown in Tables 1 and 2.

Table 1 shows that height in the TFL 3 inventory was consistently overestimated in all strata. The average height overestimation ranged from 1.5 m for the cedar/hemlock stratum to 3.5 m in the fir/pine/larch/deciduous stratum. The trends for age were less consistent. The relationship between ground height (and age) and inventory height (and age) by stratum are shown graphically in Appendix C.

Potential age-related trends in adjustment bias were examined within each of these strata using plots of residual values[14] (see Appendix C). Balsam was the only stratum where a noticeable trend in the bias was apparent. In the balsam stratum, adjusted attributes appeared to be, on average, slightly underestimated in younger stands and slightly overestimated in older stands. Based on graphical inspection, 120 years appeared to be a reasonable approximation for an age break related to the bias. The height and age adjustment factors for the balsam stratum based on sub-stratification using

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[11] "The Statistical Estimation and Adjustment Process using a PPSWR Sampling Design in the Vegetation Resource Inventory", 2001, prepared by Carl James Schwarz for the Ministry of Forests, Resources Inventory Branch.

[12] Biometrician, Research Branch, Ministry of Forests.

[13] Refer to Appendix B for further details.

[14] Plots of "residual" values for adjusted attributes (ground value minus the adjusted value) can be used to assess potential bias problems associated with an adjustment model.

a 120 year age break are shown in Tables 1 and 2. By sub-stratifying the balsam stratum and applying separate adjustment factors based on a 120 year age break, the age-related trends in bias in this stratum were diminished[15].

Table 1: Descriptive statistics and ratio of means adjustment factors for height, by stratum.

Stratum	*n*	*Mean ground height*	*Mean inventory height*	*Correlation*	***Height adjustment ratio of means***
FPLD[16]	27	22.019	25.552	0.542	***0.862***
Cedar/Hemlock	11	21.036	22.564	0.824	***0.932***
Balsam	25	17.240	19.540	0.691	***0.882***
Balsam < 121 years	*12*	*15.600*	*15.925*	*0.795*	***0.980***
Balsam > 120 years	*13*	*18.754*	*22.892*	*0.685*	***0.819***
Spruce	22	24.459	27.314	0.764	***0.895***

Table 2: Descriptive statistics and ratio of means adjustment factors for age, by stratum.

Stratum	*n*	*Mean ground age*	*Mean inventory age*	*Correlation*	***Age adjustment ratio of means***
FPLD	27	86.348	84.741	0.678	***1.019***
Cedar/Hemlock	11	101.176	109.364	0.956	***0.925***
Balsam	25	120.504	138.880	0.621	***0.868***
Balsam < 121 years	*12*	*96.683*	*81.083*	*0.391*	***1.192***
Balsam > 120 years	*13*	*142.492*	*192.231*	*0.725*	***0.741***
Spruce	22	184.227	180.409	0.764	***1.021***

3.2 Volume adjustment

To develop the volume adjustment ratios, the height and age adjustment factors (Tables 1 and 2) were applied to the rank 1 inventory ages and heights for the samples. These adjusted heights and ages, together with the unadjusted species composition, crown closure, and stocking class, were

[15] Based on a visual comparison of figures C11 & C17, and C15 & C18 in Appendix C.

[16] FPLD stratum includes fir, pine, larch and deciduous leading polygons.

input into VDYP v6.6d to produce "attribute-adjusted" inventory volumes. The adjustment ratios for volume were then calculated based on the ratio of ground volume to "attribute-adjusted" inventory volume.

The utilization used in the analysis of the TFL 3 VRI data was live stems 17.5cm + dbh for all polygons except for polygons where the inventory indicated lodgepole pine as the leading species; for these polygons the utilization was 12.5cm + dbh. Volumes were calculated net of decay, waste and breakage (dwb). This utilization applied to both inventory and ground volumes.

Ground net volumes were compiled using the 1976 Ministry of Forests Forest Inventory Zone Decay, Waste and Breakage factors to estimate decay, waste and breakage. In addition, ground volumes were also compiled using the standard VRI call grading/net factoring. However since there was no NVAF sampling carried out in this unit, the net factored volumes were not adjusted with an NVAF.

Table 3 below presents volume adjustment factors based on loss factor volumes whereas Table 4 provides adjustments based on net factored (without NVAF) volumes.

Table 3: Loss factor (LF) volume adjustment factors by stratum (based on Table 1 & 2 age and height adjustments). Utilization: 17.5cm + dbh except 12.5cm + dbh for lodgepole pine leading, net dwb.

Stratum	*n*	*Mean ground vol/ha (Loss factors)*	*Mean "attribute-adjusted" inventory vol/ha*[17]	*Correlation*	***Volume adjustment ratio of means (LF)***
FPLD	27	221.300	163.063	0.476	***1.357***
Cedar/Hemlock	12	216.841	210.533	0.585	***1.030***
Balsam	27	132.717	107.237	0.714	***1.238***
Balsam < 121 years	*14*	*124.841*	*94.286*	*0.738*	***1.324***
Balsam > 120 years	*13*	*141.198*	*123.377*	*0.755*	***1.144***
Spruce	22	229.778	273.736	0.565	***0.839***

[17] "Attribute-adjusted" inventory volume/ha is volume from VDYP based on *adjusted* inventory heights and ages.

Table 4: Net factored (NF) volume adjustment factor by stratum (based on Table 1 & 2 age and height adjustments). Utilization: 17.5cm + dbh except 12.5cm + dbh for lodgepole pine leading, net dwb.

Stratum	*n*	*Mean ground vol/ha (Net factored)*	*Mean "attribute-adjusted" inventory vol/ha*	*Correlation*	***Volume adjustment ratio of means (NF)***
FPLD	27	235.269	163.063	0.428	***1.443***
Cedar/Hemlock	12	263.750	210.533	0.633	***1.253***
Balsam	27	145.500	107.237	0.742	***1.357***
Balsam < 121 years	*14*	*130.956*	*94.286*	*0.741*	***1.389***
Balsam > 120 years	*13*	*161.163*	*123.377*	*0.761*	***1.306***
Spruce	22	264.580	273.736	0.639	***0.967***

The "attribute-adjusted" inventory volumes were adjusted based on the factors in Tables 3 and 4. The resulting "final" adjusted inventory volumes were then compared with the ground volumes in each stratum. The plots of the "residual" values (i.e. ground value minus adjusted value) were used to evaluate the volume adjustments. Graphs showing the volume relationships and the residuals are provided in Appendix D. As was observed for height and age, there appeared to be an age-related bias associated with the adjustment in the balsam stratum. In general, adjusted volumes appeared to be underestimated in young stands and overestimated in older stands. Hence, alternative adjustment factors, based on a 120 year age break, were developed for the balsam stratum. These are also shown in Tables 3 and 4. Further residuals plots for the balsam stratum suggested that using the age-specific volume adjustment factors in Tables 3 and 4 reduced the age-related bias in the adjustment[18].

3.3 Overall volume impact

The volume factors in Tables 3 and 4 represent volume adjustments after inventory heights and ages have been adjusted. To determine the overall volume impact of the set of adjustments (age, height and volume), the ground volumes were compared with the unadjusted inventory volumes (i.e. inventory volumes prior to any age or height adjustment). These overall volume impact ratios are shown for loss factor volumes (Table 5) and for net factored volumes (Table 6).

[18] Based on a visual comparison of figures D13 & D16 in Appendix D.

Table 5: Overall volume impact by stratum based on loss factor volumes. Utilization: 17.5cm + dbh except 12.5cm + dbh for lodgepole pine leading, net dwb.

Stratum	*n*	*Mean ground vol/ha (Loss factors)*	*Mean unadjusted inventory vol/ha*	*Correlation*	***Overall volume impact (LF)***
FPLD	27	221.300	215.437	0.498	***1.027***
Cedar/Hemlock	12	216.841	239.075	0.598	***0.907***
Balsam	27	132.717	133.237	0.714	***0.996***
Inventory age <121 yrs	14	124.841	97.750	0.737	***1.277***
Inventory age >120 yrs	13	141.198	171.454	0.758	***0.824***
Spruce	22	229.778	318.182	0.594	***0.722***

Table 6: Overall volume impact by stratum based on net factored volumes. Utilization: 17.5cm + dbh except 12.5cm + dbh for lodgepole pine leading, net dwb.

Stratum	*n*	*Mean ground vol/ha (Net factored)*	*Mean unadjusted inventory vol/ha*	*Correlation*	***Overall volume impact (NF)***
FPLD	27	235.269	215.437	0.453	***1.092***
Cedar/Hemlock	12	263.750	239.075	0.647	***1.103***
Balsam	27	145.500	133.237	0.742	***1.092***
Inventory age <121 yrs	14	130.956	97.750	0.740	***1.340***
Inventory age >120 yrs	13	161.163	171.454	0.764	***0.940***
Spruce	22	264.580	318.182	0.666	***0.832***

Tables 5 and 6 show the stratum differences between an adjustment based on loss factor versus net factored volumes. In all strata, net factoring indicates higher volumes compared with loss factors. The difference between net factored volumes and loss factor volumes is greatest in the cedar/hemlock stratum and least in the young (inventory age <121 years) balsam stratum.

The results for net factored volumes clearly suggest that loss factors underestimate the actual ground volumes. However, in the VRI standard procedures, net factored volumes must be further adjusted using the NVAF to correct for taper and hidden decay. Province-wide, studies to date indicate that net factoring without applying the NVAF typically overestimates volumes by about

2%[19]. Hence while the loss factor adjustments (Table 5) may be underestimating volume, the adjustment based on net factored volumes (Table 6) may be overestimating volume. Without completion of an NVAF study in TFL 3, the exact magnitude of the volume bias cannot be quantified.

3.4 Sampling error

The original VPIP specified a target sampling error of 10% (at a 95% probability level) for the vegetated, treed portion of TFL 3 greater than 20 years of age. To provide an indication of the sampling error achieved in the adjustment process, a comparison of the overall ground volume and the overall unadjusted inventory volume was made. The overall ratio and its standard error were computed using the formula for a combined ratio estimate after a pre-stratified PPSWR sample (see Appendix B). The combined ratio estimate is computed as the ratio of the estimated total ground volume for the entire unit divided by the estimated total unadjusted inventory volume for the entire unit. The results are summarized in the tables below.

The overall loss factor volume impact of 0.88 (Table 8) is similar to the loss factor volume ratio of 0.87 that was reported in the 1995 inventory audit[20] for TFL 3. Tables 7 and 8 also illustrate the overall impact of using loss factor volumes versus net factored volumes in the adjustment. Net factoring results in about 12% more volume overall compared with using loss factors.

Table 7: Combined ratio estimate and its sampling error (no age sub-stratification for balsam). Utilization: 17.5cm + dbh except 12.5cm + dbh for lodgepole pine leading, net dwb.

Volume	*n*	*Overall estimated total ground vol/ha*	*Overall estimated total unadj'd inventory vol/ha*	*Ratio of means*	*95% CI for ratio*	*Sampling error (as % of ratio)*
Loss factor volume	*88*	*11625345*	*13060587*	*0.890*	*0.785 – 0.995*	*11.8%*
Net factored volume	*88*	*13016066*	*13060587*	*0.997*	*0.876 – 1.118*	*12.1%*

[19] Keith Tudor, Will Smith (pers. comm.)

[20] The Inventory Audit population of interest was productive forest, 60+ years of age. This differs from the TFL 3 VRI population of interest which was vegetated treed, greater than 20 years of age.

Table 8: Combined ratio estimate and its sampling error with age sub-stratification for balsam. Utilization: 17.5cm + dbh except 12.5cm + dbh for lodgepole pine leading, net dwb.

Volume	*n*	*Overall estimated total ground vol/ha*	*Overall estimated total unadj'd inventory vol/ha*	*Ratio of means*	*95% CI for ratio*	*Sampling error (as % of ratio)*
Loss factor volume	*88*	*11655172*	*13194994*	*0.883*	*0.779 – 0.987*	*11.8%*
Net factored volume	*88*	*13071151*	*13194994*	*0.991*	*0.871 – 1.111*	*12.1%*

The sampling errors achieved exceed the target level (10%) that was specified[21] by about 2%. This slight deviation from the target level should be considered acceptable in that it does not increase the risk of drawing wrong inferences from the data beyond reasonable limits. However, the stakeholders should consider establishing more samples in the TFL to reduce the sampling error to a level within the specified standard.

4. RECOMMENDATIONS

There appear to be significant age-related trends in the bias observed for adjusted inventory volume when a single adjustment factor is applied to the balsam leading stratum. As a result, the adjustment factors for this stratum based on a 120 year age break (see Tables 1, 2, 3 & 4) are recommended. No obvious age-related bias trends were observed in any strata other than balsam. Volume adjustment ratios based on loss factor volumes and net factored volumes were provided. Using the loss factor ratios would provide a more conservative estimate of volume, consistent with the status quo. Using the net factored volume without an NVAF would likely overestimate volume. The magnitude of this overestimation cannot be determined without NVAF sampling. The difference between the loss factor and the net factored volumes in TFL 3 is about 12% on average. Based on results to date observed elsewhere in the province, loss factors have tended to underestimate volume by about 10%

[21] The 95% confidence interval and the sampling error are dependent on the t-value that is multiplied by the standard error of the ratio. Tables 7 and 8 assumed a *z*-value of 1.96 to construct the confidence interval and hence the sampling error. An alternative approximate method to calculate an "effective" degrees of freedom for a *t*-value was also examined, based on formulae provided in Cochran's "Sampling Techniques" (1977). For Table 8, the calculated effective degrees of freedom of 67 and its corresponding *t*-value resulted in sampling errors of 12.0% and 12.3% for loss factors and net factoring respectively.

whereas net factoring (without NVAF) has overestimated volumes by about 2%. However, without NVAF sampling in TFL 3, it is not known if similar trends would hold in this unit.

The scope of this analysis was limited to analysis of the VRI data and development of a set of inventory adjustment factors for TFL 3. The next step in the VRI process is applying these factors in the adjustment of the TFL 3 inventory file. Once the inventory file is adjusted, it is recommended that the pre-adjustment total unit volume and the post-adjustment volume be compared to determine the actual impact of the adjustment on the TFL 3 standing volume.

5. APPENDIX A: INVENTORY AND GROUND ATTRIBUTES USED IN THE ADJUSTMENT

			Inventory Attributes							Ground Attributes				
Mapsheet	Poly	Sample ID code	Species Composition	Proj'd Age	Proj'd Height	Proj'd 2nd spp Age	Proj'd 2nd spp Height	CC %	Proj'd Stk Cls	Vol/ha 17.5cm+ net dwb	Leading spp at 4cm+dbh	Ground Age	Ground Height	NVAF vol/ha "mixed" utiln	LF vo/ha "mixed" utiln
082F051	2238	3031-0001-QO1	BL 60 SE 40	139.0	18.9			30	1	138.3	BL	97	6.2	0.0	0.0
082F061	1902	3031-0002-QO1	B 60 S 30 PL 10	209.0	27.6			50	1	281.9	HW	212	20.6	307.4	281.3
082F071	2011	3031-0003-QO1	PL 100	93.0	24.9			70	3	321.3	PL	74	22.1	286.6	263.1
082F061	2462	3031-0005-QO1	B 80 L 20	44.0	8.3			20	0	18.9	S	.	.	164.6	164.6
082F062	1846	3031-0006-QO1	FD 40 PL 30 L 30	104.0	28.4			50	0	231.2	FD	72	26.1	381.8	376.4
082F062	1796	3031-0007-QO1	S 40 L 30 H 20 CW 10	99.0	25.7			30	0	261.2	CW	146	14.6	71.5	68.8
082F062	2642	3031-0008-QO1	B 80 S 20	104.0	22.5			40	0	210.1	BL	202	16.4	124.7	113.1
082F051	1571	3031-0010-QO1	H 40 S 30 B 20 CW 10	49.0	11.6			50	0	44.6	HW	53	10.3	131.4	131.7
082F061	2427	3031-0011-QO1	L 50 CW 30 FD 10 S 10	74.0	22.2	74.0	25.3	70	0	159.5	CW	59	15.5	301.1	267.0
082F072	1783	3031-0012-QO1	CW 60 S 30 BL 5 HW 5	249.0	38.5			30	1	574.2	CW	187	30.5	913.3	564.4
082F062	1611	3031-0013-QO1	L 80 FD 20	279.0	40.1			40	1	315.5	FD	72	22.0	408.4	430.1
082F062	2311	3031-0014-QO1	L 60 PL 20 FD 15 EP 5	73.0	28.1			70	0	225.7	CW	70	11.0	69.8	65.9
082F071	2173	3031-0015-QO1	L 50 FD 40 PW 10	73.0	25.0			75	0	176.6	HW	72	15.3	99.4	89.2
082F061	1863	3031-0016-QO1	S 60 B 40	69.0	20.8			20	0	155.9	SE	50	17.4	91.4	92.4
082F062	1864	3031-0017-QO1	FD 80 CW 10 L 5 H 5	138.0	31.9	108.0	28.2	65	1	327.1	CW	197	30.2	672.0	561.5
082F073	1526	3031-0020-QO1	AT50 PL25 FD10 EP10 S5	69.0	19.5	79.0	21.3	30	0	73	FD	58	24.7	52.1	49.3
082F071	2011	3031-0021-QO1	PL 100	93.0	24.9			70	3	321.3	PL	77	20.3	232.1	211.1
082F051	1901	3031-0022-QO1	S 80 B 20	189.0	30.6	169.0	22.8	20	1	297.6	BL	135	18.9	164.6	124.8
082F072	1727	3031-0023-QO1	SE 90 BL 10	209.0	30.6			40	1	341.4	SE	221	32.8	176.1	152.6

082F061	2561 3031-0024-QO1	S30 FD20 B20 PL20 L10	99.0	28.7			40	0	301.6	BL	230	22.6	211.5	183.9
082F052	1768 3031-0025-QO1	S 50 B 50	209.0	30.6	189.0	24.7	40	1	295.5	BL	145	16.3	104.8	91.0
082F051	1905 3031-0027-QO1	S 60 B 40	189.0	34.6	169.0	20.7	35	1	353.3	BL	168	26.3	141.2	106.2
082F062	2442 3031-0028-QO1	FD 60 PL 30 S 10	99.0	25.4			60	0	233.5	SE	68	17.3	123.6	118.6
082F061	1894 3031-0029-QO1	B 60 PL 30 S 10	84.0	17.6	84.0	17.1	10	0	116.5	PL	33	10.8	47.5	41.1
082F061	1589 3031-0030-QO1	BL 80 S 20	219.0	25.0			40	1	249.9	BL	174	21.5	351.4	280.5
082F071	2094 3031-0031-QO1	S 50 B 50	209.0	32.5	189.0	27.7	30	1	307.1	BL	246	20.2	147.7	116.5
082F063	1505 3031-0032-QO1	B 50 S 30 PL 20	79.0	19.9			50	0	168.3	BL	106	24.5	265.8	261.5
082F051	2220 3031-0033-QO1	B 70 S 30	179.0	18.6			10	2	59.1	BL	94	9.9	50.3	48.8
082F061	2465 3031-0034-QO1	L 80 B 10 S 10	74.0	25.3			70	0	172.8	CW	56	20.2	227.2	227.2
082F051	2036 3031-0035-QO1	B 60 S 35 PW 5	209.0	26.6			25	1	228.5	BL	176	17.1	123.6	100.1
082F051	2045 3031-0036-QO1	BL 80 SE 20	159.0	14.6	159.0	17.0	10	2	42	SE	61	5.1	57.1	50.3
082F061	2019 3031-0037-QO1	B 90 S 10	189.0	21.6			40	1	194	BL	143	20.7	287.1	255.5
082F063	1556 3031-0038-QO1	S 70 L 20 B 10	119.0	30.3			55	0	354.8	HW	343	28.0	534.3	460.5
082F072	2166 3031-0039-QO1	S 55 B 30 PL 15	255.0	30.7	208.0	24.5	45	1	316.2	BL	131	21.2	344.1	313.7
082F071	1690 3031-0040-QO1	S 70 B 30	189.0	27.7	189.0	25.7	45	1	276.3	BL	133	22.6	178.3	148.8
082F072	2295 3031-0041-QO1	S 60 B 40	268.0	32.3	238.0	25.4	50	1	339.8	BL	146	23.1	268.0	232.7
082F052	1558 3031-0042-QO1	L 60 FD 40	108.0	23.1			50	0	133.4	CW	169	23.1	464.9	391.8
082F061	1762 3031-0043-QO1	H 50 CW 40 S 10	48.0	17.0			70	0	126.9	CW	.	.	171.4	172.7
082F082	1506 3031-0044-QO1	B 70 S 30	189.0	18.6			25	2	63.5	BL	142	19.5	70.7	53.1
082F071	1611 3031-0045-QO1	B 90 S 10	109.0	15.0			10	0	90.2	BL	103	18.6	146.4	142.4
082F052	1937 3031-0046-QO1	H 60 CW 30 FD 10	79.0	15.8	79.0	17.5	80	0	122.3	CW	57	21.3	414.4	416.0
082F061	1909 3031-0047-QO1	B 60 S 40	159.0	22.8			40	1	196.7	BL	88	20.7	117.2	115.8
082F052	1599 3031-0048-QO1	LW 80 FD 20	89.0	21.7			70	0	104.8	HW	99	22.6	291.7	258.5
082F052	1910 3031-0049-QO1	H 70 CW 20 PW 10	144.0	24.9			70	1	313.9	HW	114	28.7	433.5	340.4
082F052	1574 3031-0051-QO1	L 60 FD 30 PW 5 CW 5	93.0	33.6	88.0	31.9	70	0	318.2	FD	100	30.3	303.7	300.2
082F072	44 3031-0052-QO1	BL 70 SE 30	85.0	7.4			5	0	3.7	BL	64	8.4	10.5	8.7

082F071	1982 3031-0053-QO1	L 55 FD 25 S 15 H 5	73.0	25.0			70	0	179.2	LW	70	25.8	193.8	184.9
082F061	1505 3031-0055-QO1	S 50 B 50	229.0	37.4	229.0	27.6	55	1	413.9	BL	141	26.5	336.9	293.2
082F071	1647 3031-0057-QO1	FD 60 S 20 L 15 H 5	79.0	22.9			35	0	166.2	FD	74	17.9	177.7	173.8
082F072	1963 3031-0058-QO1	S 50 B 50	209.0	26.7	184.0	21.7	30	1	232.5	BL	163	23.0	153.6	130.4
082F062	2238 3031-0059-QO1	B 70 S 30	103.0	22.3			50	0	198.3	BL	116	22.3	322.2	317.0
082F051	1926 3031-0060-QO1	H 60 S 20 CW 20	258.0	35.3			50	1	595.1	HW	265	29.6	245.9	235.8
082F072	1586 3031-0061-QO1	BL 60 SE 40	209.0	18.5			20	2	62.1	BL	82	12.7	129.3	128.5
082F051	1534 3031-0062-QO1	S 60 CW 20 H 10 B 10	155.0	44.6	259.0	38.5	60	1	568.8	CW	230	31.1	496.5	395.2
082F061	1524 3031-0063-QO1	L 50 H 40 B 10	63.0	20.2			60	0	140	BL	69	18.1	167.5	170.2
082F071	1511 3031-0064-QO1	B 70 S 30	248.0	34.5	248.0	34.3	50	1	381	SE	214	26.5	348.0	313.7
082F061	1592 3031-0065-QO1	B 70 S 20 PL 10	79.0	16.7			10	0	105.3	BL	51	9.8	66.2	57.7
082F072	1704 3031-0066-QO1	BL 90 SE 10	44.0	7.0			30	0	9	BL	77	7.3	0.0	0.0
082F061	2106 3031-0067-QO1	FD 40 H 40 CW 10 L 10	144.0	31.9	89.0	27.8	50	1	395.5	HW	112	27.3	312.6	299.1
082F071	2139 3031-0068-QO1	S 90 B 10	209.0	37.4			50	1	475.9	SE	278	40.8	577.2	460.9
082F051	2062 3031-0069-QO1	S 70 B 30	238.0	27.5			60	1	292.7	SE	273	31.3	311.9	270.5
082F062	1740 3031-0070-QO1	EP55 FD20 PL10 L10 S5	68.0	20.9			65	0	101	EP	69	18.9	135.7	128.8
082F071	2158 3031-0071-QO1	H40L30PL10FD10CW10	79.0	25.1			70	0	274.6	HW	86	14.8	99.2	91.7
082F061	1523 3031-0072-QO1	L50FD25CW10HW10PW5	73.0	27.1	73.0	27.2	80	0	222.9	FD	71	24.0	181.2	181.2
082F071	1664 3031-0073-QO1	FD 50 PL 30 L 10 S 10	84.0	22.7	84.0	22.3	40	0	154.2	PL	66	17.3	115.3	99.9
082F051	1703 3031-0074-QO1	FD 90 SE 10	129.0	24.9			10	2	78.1	FD	133	16.5	35.5	31.9
082F061	2735 3031-0075-QO1	B 90 S 10	169.0	16.6	169.0	19.9	10	2	55.9	SE	170	20.9	95.8	82.2
082F072	1683 3031-0076-QO1	S 80 BL 20	288.0	30.4	208.0	21.5	15	2	117.1	BL	115	15.1	78.2	76.4
082F071	1783 3031-0077-QO1	S 60 B 30 PL 10	189.0	32.6	159.0	26.9	50	1	354	BL	125	16.8	110.5	89.9
082F062	2241 3031-0078-QO1	S 80 B 20	159.0	28.9			45	1	302.9	S	107	25.2	426.1	420.1
082F052	1511 3031-0079-QO1	S 60 B 40	169.0	27.8			40	1	263.8	SE	328	25.0	313.9	288.3
082F072	1966 3031-0080-QO1	S 70 B 20 H 10	209.0	35.5			25	1	377.7	SE	198	39.3	582.4	538.0
082F062	2368 3031-0081-QO1	FD 45 L 25 PL 15 PY 15	99.0	33.1			70	0	349	CW	109	30.1	186.8	191.2

082F061	1924 3031-0082-QO1	H 40 CW 30 L 20 FD 10	54.0	13.6			55	0	53.1	HW	66	16.9	110.7	110.7
082F062	1687 3031-0083-QO1	FD 89 CW 11	96.0	34.7			70	0	401.4	FD	94	34.3	340.8	332.3
082F061	1919 3031-0084-QO1	H 40 L 30 FD 20 CW 10	74.0	22.2	69.0	20.3	65	0	216.1	LW	67	24.0	197.7	190.9
082F072	1868 3031-0086-QO1	B 60 PL 30 S 10	69.0	11.9			20	0	51.1	S	147	17.0	100.6	90.3
082F062	2242 3031-0087-QO1	B 50 S 40 PL 10	104.0	23.5			50	0	220.4	BL	101	24.5	278.9	273.3
082F061	1929 3031-0088-QO1	PW 50 L 30 H 10 CW 10	69.0	24.2			80	0	220.9	HW	76	11.4	71.3	71.3
082F062	2330 3031-0089-QO1	FD 90 EP 10	83.0	25.7			55	0	186.8	FD	76	27.4	342.6	323.6
082F061	2472 3031-0090-QO1	L 80 CW 10 FD 10	59.0	20.8			80	0	107.7	LW	69	24.8	177.2	177.2
082F061	2213 3031-0091-QO1	B 60 PL 30 FD 10	69.0	19.5			50	0	150.5	BL	103	22.0	213.0	208.0
082F072	1689 3031-0092-QO1	BL 100	44.0	8.3			15	0	26.2	BL	58	5.6	0.0	0.0
082F081	1590 3031-0093-QO1	BL 76 S 24	222.0	28.2			40	1	276	BL	199	42.4	157.3	125.5
082F062	2556 3031-0105-QO1	H 50 FD 20 CW 20 L 10	104.0	27.4			70	0	342.7	CW	80	27.8	279.9	224.4
082F051	12 3031-0501-QO1	BL 50 SE 40 HW 10	30.0	3.5			10	0	0	CW	.	.	93.1	70.1
082F052	79 3031-0503-QO1	CW60EP10AT10HW10FD10	85.0	21.9			50	0	199.9	CW	95	20.3	100.6	140.0
082F052	43 3031-0504-QO1	HW37CW32SE15BL12FD4	33.0	9.7	33.0	12.1	30	0	5.5	CW	43	7.2	27.5	22.8

6. APPENDIX B: RATIO OF MEANS AND VARIANCE FORMULAE FOR PPSWR

The following description of the appropriate strata and overall ratio estimators for a PPSWR design were provided by Dr. Peter Ott (Ministry of Forests, Research Branch).

Combined Ratio Estimator after a Pre-Stratified PPSWR Sample

The population has been pre-stratified into H *strata and a PPSWR sample was taken within each stratum. Getting a ratio estimate is easy for each stratum (e.g. domain) but what if we want to obtain an overall estimate for the entire unit? Read on…*

Notation

n_h – number of polygons sampled from h^{th} stratum, $h = 1,2,\mathrm{K}\ ,H$

Z_h – area within h^{th} stratum (hectares)

z_j – area of j^{th} polygon

p_j – selection probability for j^{th} polygon $= \dfrac{z_j}{Z_h}$

$\hat{y}_{hj}$ – estimated ground vol per ha of j^{th} observation in h^{th} stratum, $j = 1,2,\mathrm{K}\ ,n_h$

x_{hj} – photo-interpreted vol per ha of j^{th} observation in h^{th} stratum

$\hat{Y}_{hj}$ – estimated ground total volume of j^{th} observation in h^{th} stratum $= z_j \cdot \hat{y}_{hj}$

X_{hj} – photo-interpreted total volume of j^{th} observation in h^{th} stratum $= z_j \cdot x_{hj}$

$\bar{y}_h$ – estimated mean ground vol per ha in h^{th} stratum $= \dfrac{1}{Z_h n_h}\sum_{j=1}^{n_h}\dfrac{\hat{Y}_{hj}}{p_j} = \dfrac{1}{n_h}\sum_{j=1}^{n_h}\hat{y}_{hj}$

$\bar{x}_h$ – estimated mean photo-interpreted vol per ha in h^{th} stratum $= \dfrac{1}{Z_h n_h}\sum_{j=1}^{n_h}\dfrac{X_{hj}}{p_j} = \dfrac{1}{n_h}\sum_{j=1}^{n_h}x_{hj}$

$\hat{Y}_h$ – estimated total ground volume in h^{th} stratum $= Z_h \cdot \bar{y}_h$

$\hat{X}_h$ – estimated total photo-interpreted volume in h^{th} stratum $= Z_h \cdot \bar{x}_h$

$\hat{Y}$ – estimated total ground volume for entire unit $= \sum_{h=1}^{H}\hat{Y}_h$

$\hat{X}$ – estimated total photo-interpreted volume for entire unit $= \sum_{h=1}^{H} \hat{X}_h$

X – total photo-interpreted volume of entire population $= \sum_{h=1}^{H} \sum_{j=1}^{N_h} x_{hj}$

Combined Ratio Estimator	Its Standard Error
$\hat{R}_c = \frac{\hat{Y}}{\hat{X}} = \frac{\sum_{h=1}^{H} Z_h \cdot \bar{y}_h}{\sum_{h=1}^{H} Z_h \cdot \bar{x}_h}$	$s.e.(\hat{R}_c) = \sqrt{\frac{1}{X^2} \sum_{h=1}^{H} \frac{Z_h^2}{n_h} s_h^2}$, where $s_h^2 = \frac{1}{n_h - 1} \sum_{j=1}^{n_h} (e_{hj} - \bar{e}_h)^2$, $e_{hj} = \hat{y}_{hj} - \hat{R}_c x_{hj}$, and $\bar{e}_h = \frac{1}{n_h} \sum_{j=1}^{n_h} e_{hj}$ or equivalently $s.e.(\hat{R}_c) = \sqrt{\frac{1}{X^2} \sum_{h=1}^{H} \frac{\tau_h^2}{n_h}}$, where $\tau_h^2 = \frac{1}{n_h - 1} \sum_{j=1}^{n_h} \left(\frac{\varepsilon_{hj}}{p_j} - \hat{\varepsilon} \right)^2$, $\varepsilon_{hj} = \hat{Y}_{hj} - \hat{R}_c X_{hj}$, and $\hat{\varepsilon}_h = \frac{1}{n_h} \sum_{j=1}^{n_h} \frac{\varepsilon_{hj}}{p_j}$ Note that for both versions, you may use $\hat{X}$ instead of X, if it is unavailable.

7. APPENDIX C: HEIGHT AND AGE RELATIONSHIPS AND RESIDUALS PLOTS

Height Relationships by Stratum

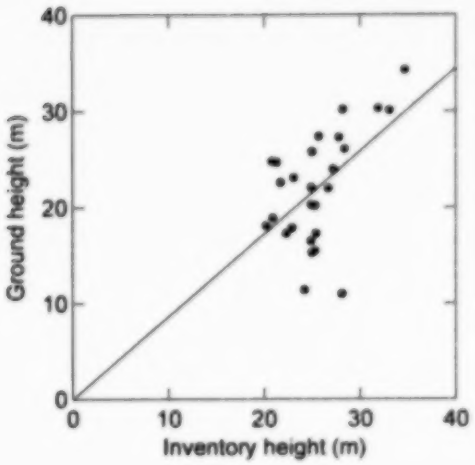

Fig. C1: Ground height versus inventory height for Fir/Pine/Larch/Deciduous stratum. Line on graph corresponds to height adjustment ratio.

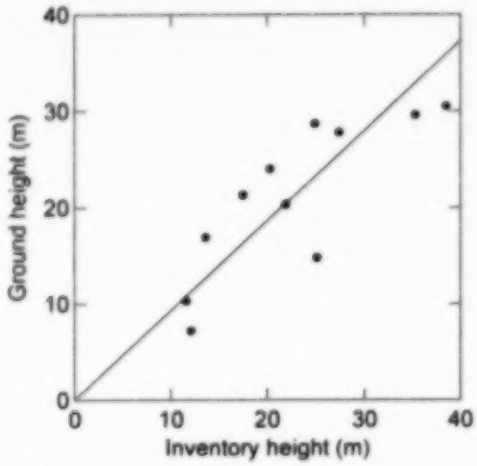

Fig. C2: Ground height versus inventory height for Cedar/Hemlock stratum. Line on graph corresponds to height adjustment ratio.

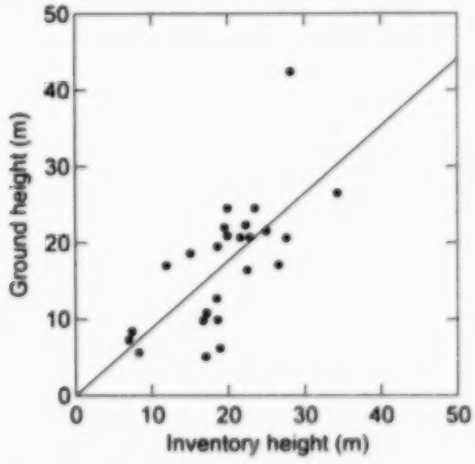

Fig. C3: Ground height versus inventory height for Balsam stratum. Line on graph corresponds to height adjustment ratio.

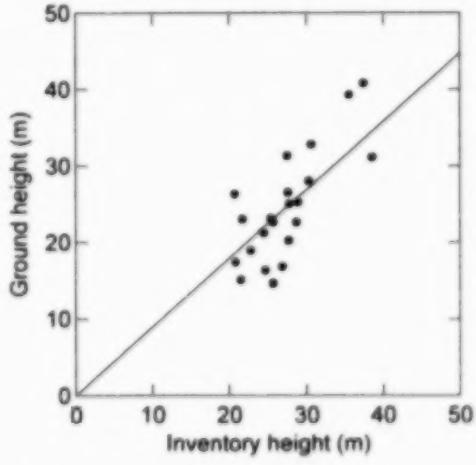

Fig. C4: Ground height versus inventory height for Spruce stratum. Line on graph corresponds to height adjustment ratio.

Age Relationships by Stratum

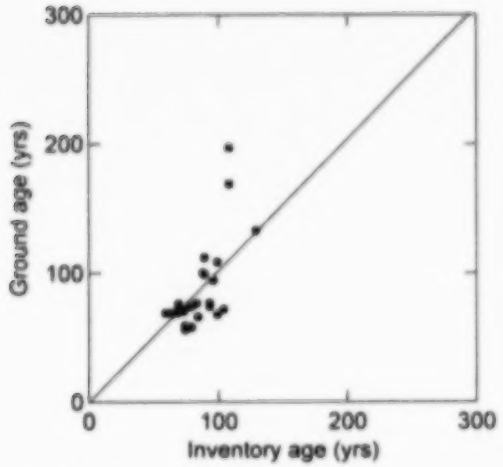

Fig. C5: Ground age versus inventory age for Fir/Pine/Larch/Deciduous stratum. Line on graph corresponds to age adjustment ratio.

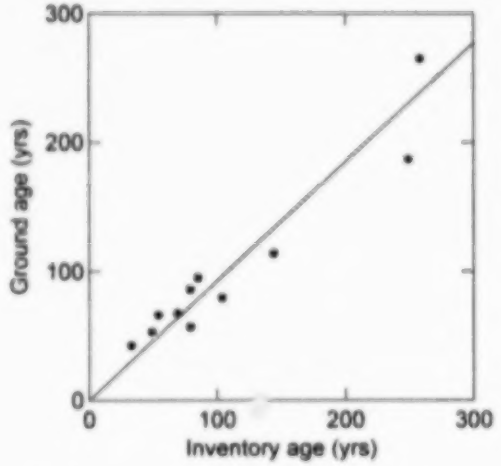

Fig. C6: Ground age versus inventory age for Cedar/Hemlock stratum. Line on graph corresponds to age adjustment ratio.

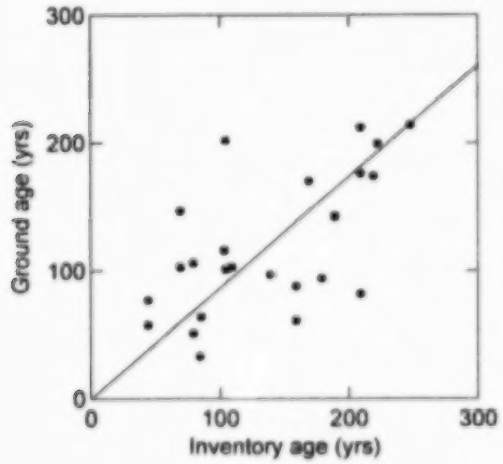

Fig. C7: Ground age versus inventory age for Balsam stratum. Line on graph corresponds to age adjustment ratio.

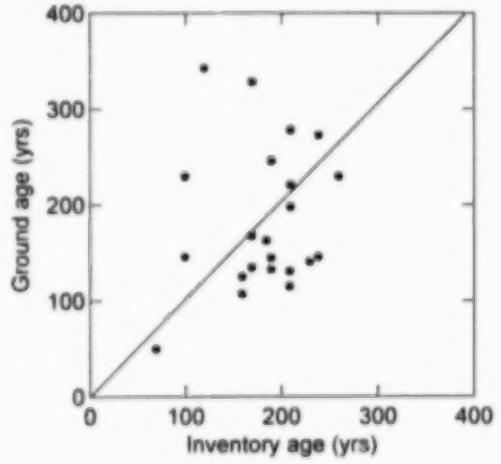

Fig. C8: Ground age versus inventory age for Spruce stratum. Line on graph corresponds to age adjustment ratio.

Height Residuals by Stratum

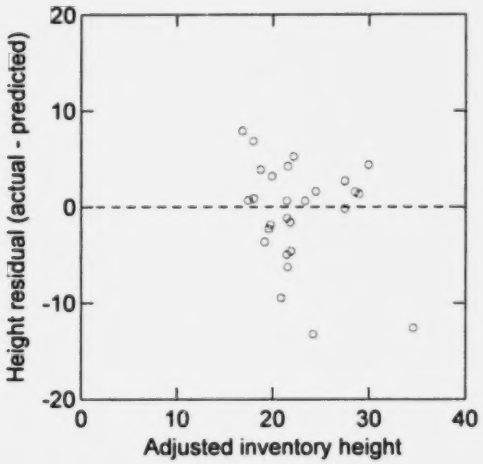

Fig. C9: Height residual (ground height – adjusted inventory height) versus adjusted inventory height for Fir/Pine/Larch/Deciduous stratum. Horizontal line represents zero bias. Points above the line represent underestimates whereas points below the line represent overestimates.

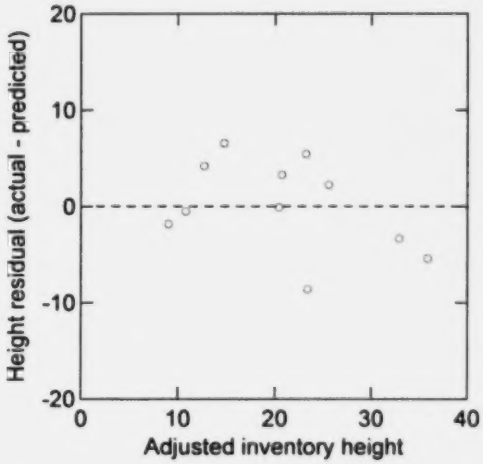

Fig. C10: Height residual (ground height – adjusted inventory height) versus adjusted inventory height for Cedar/Hemlock stratum. Horizontal line represents zero bias. Points above the line represent underestimates whereas points below the line represent overestimates.

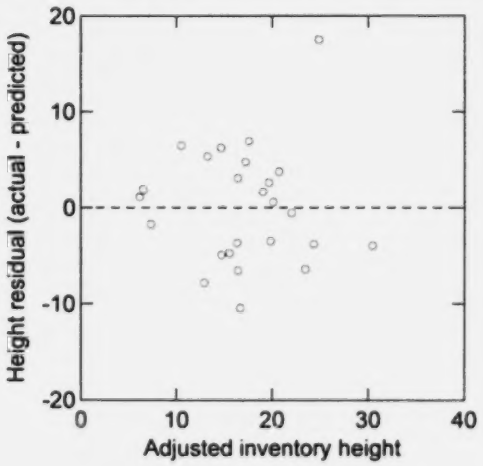

Fig. C11: Height residual (ground height – adjusted inventory height) versus adjusted inventory height for Balsam stratum. Horizontal line represents zero bias. Points above the line represent underestimates whereas points below the line represent overestimates.

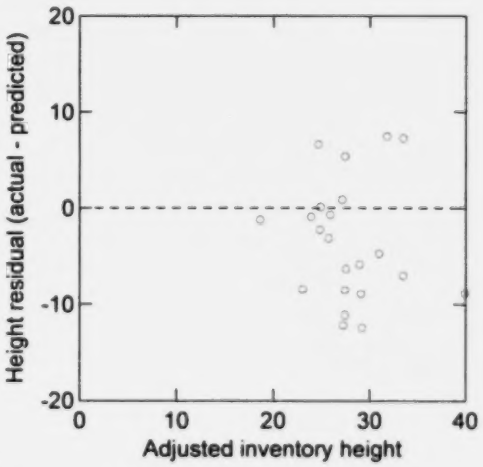

Fig. C12: Height residual (ground height – adjusted inventory height) versus adjusted inventory height for Spruce stratum. Horizontal line represents zero bias. Points above the line represent underestimates whereas points below the line represent overestimates.

Age Residuals by Stratum

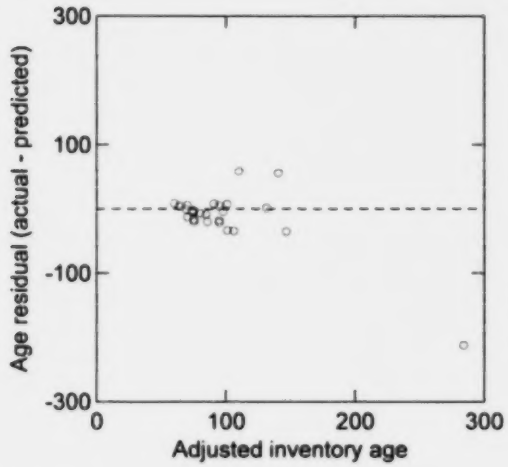

Fig. C13: Age residual (ground age – adjusted inventory age) versus adjusted inventory age for Fir/Pine/Larch/Deciduous stratum. Horizontal line represents zero bias. Points above the line represent underestimates whereas points below the line represent overestimates.

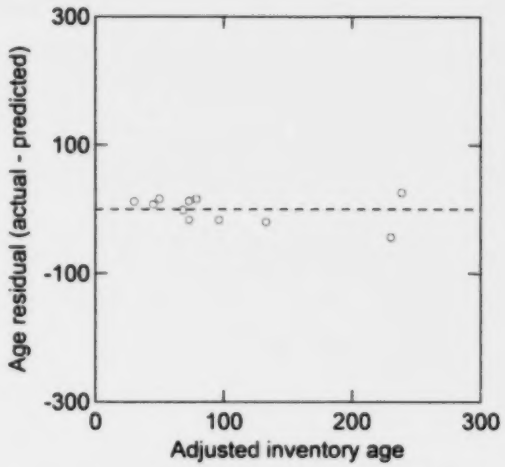

Fig. C14: Age residual (ground age – adjusted inventory age) versus adjusted inventory age for Cedar/Hemlock stratum. Horizontal line represents zero bias. Points above the line represent underestimates whereas points below the line represent overestimates.

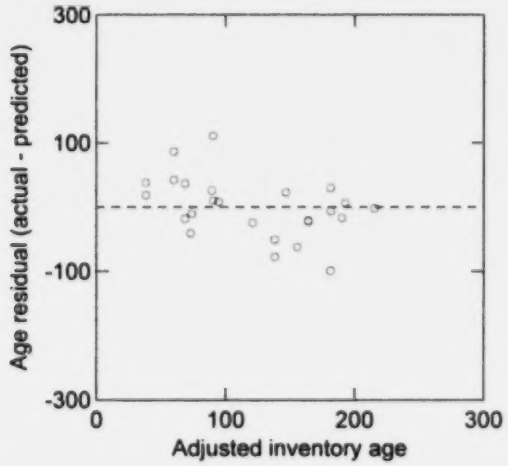

Fig. C15: Age residual (ground age – adjusted inventory age) versus adjusted inventory age for Balsam stratum. Horizontal line represents zero bias. Points above the line represent underestimates whereas points below the line represent overestimates.

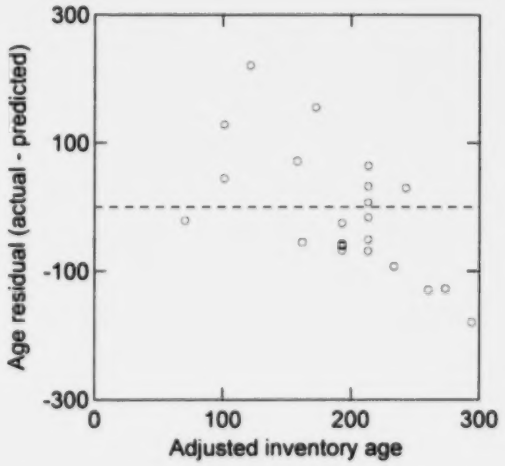

Fig. C16: Age residual (ground age – adjusted inventory age) versus adjusted inventory age for Spruce stratum. Horizontal line represents zero bias. Points above the line represent underestimates whereas points below the line represent overestimates.

Age and Height Residuals for Balsam Stratum with 2 Age Group Substrata

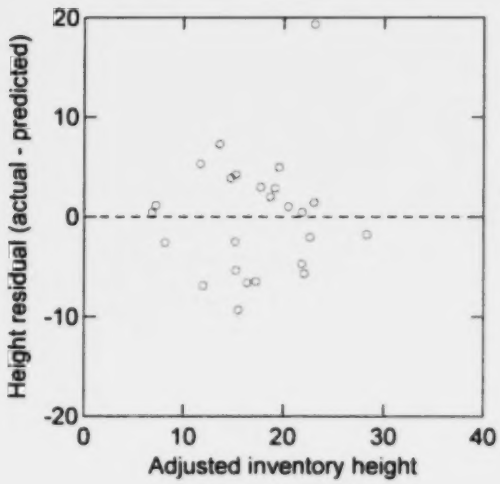

Fig. C17: Height residual (ground height – adjusted inventory height) versus adjusted inventory height for Balsam strata with 2 age substrata. Horizontal line represents zero bias. Points above the line represent underestimates whereas points below the line represent overestimates.

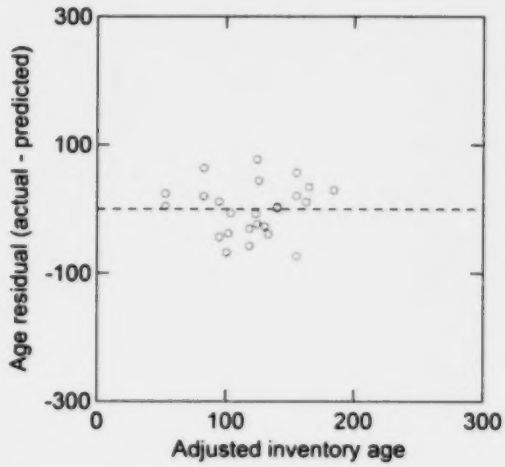

Fig. C18: Age residual (ground age – adjusted inventory age) versus adjusted inventory age for Balsam strata with 2 age substrata. Horizontal line represents zero bias. Points above the line represent underestimates whereas points below the line represent overestimates.

8. APPENDIX D: VOLUME RELATIONSHIPS AND RESIDUALS PLOTS

Volume Relationships by Stratum

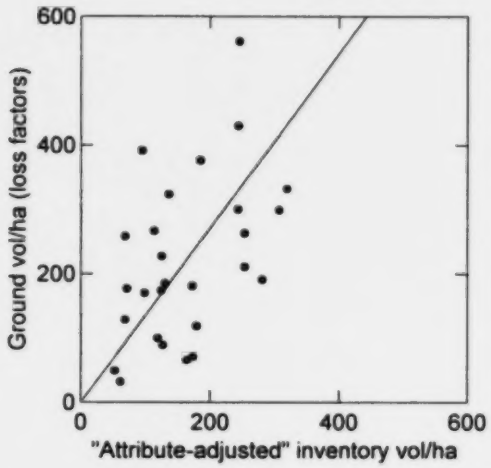

Fig. D1: Ground volume versus "attribute-adjusted" inventory volume for Fir/Pine/Larch/Deciduous stratum. Line on graph corresponds to volume adjustment ratio.

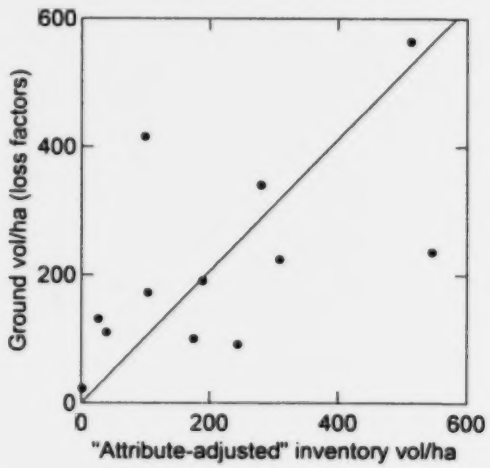

Fig. D2: Ground volume versus "attribute-adjusted" inventory volume for Cedar/Hemlock stratum. Line on graph corresponds to volume adjustment ratio.

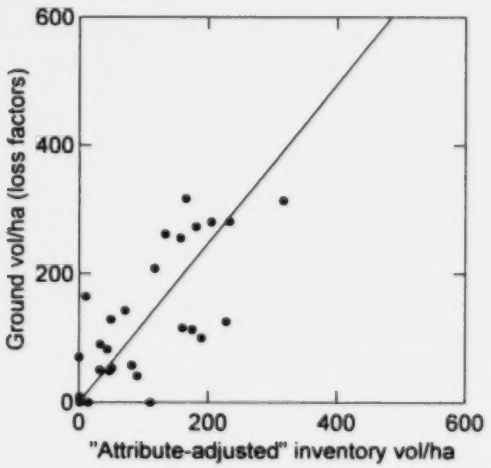

Fig. D3: Ground volume versus "attribute-adjusted" inventory volume for Balsam stratum. Line on graph corresponds to volume adjustment ratio.

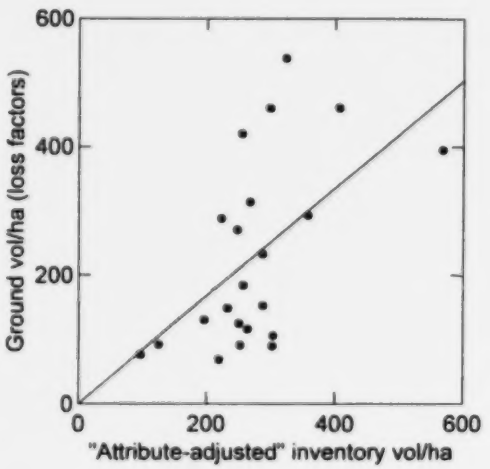

Fig. D4: Ground volume versus "attribute-adjusted" inventory volume for Spruce stratum. Line on graph corresponds to volume adjustment ratio.

Volume Relationships for Balsam Stratum with 2 Age Group Substrata

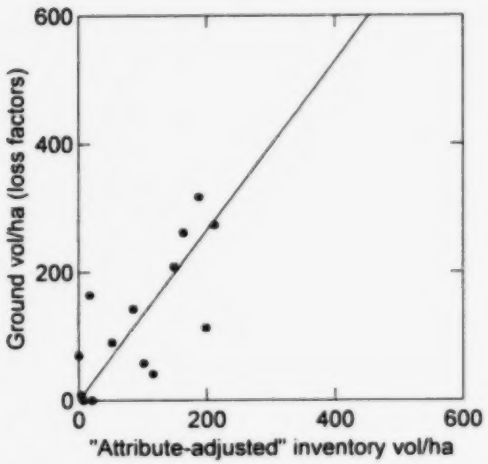

Fig. D5: Ground volume versus "attribute-adjusted" inventory volume for Balsam age <121 years stratum. Line on graph corresponds to volume adjustment ratio.

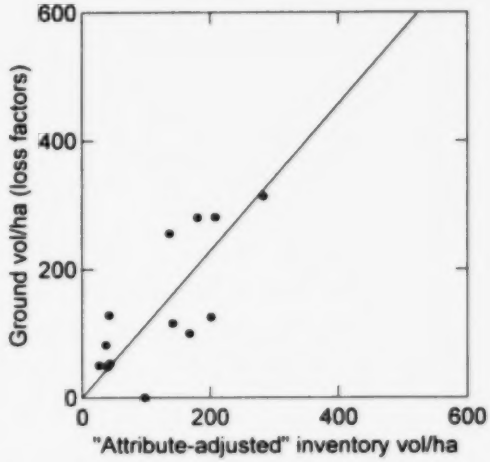

Fig. D6: Ground volume versus "attribute-adjusted" inventory volume for Balsam age >120 years stratum. Line on graph corresponds to volume adjustment ratio.

Scatter plots showing volume residuals by species stratum

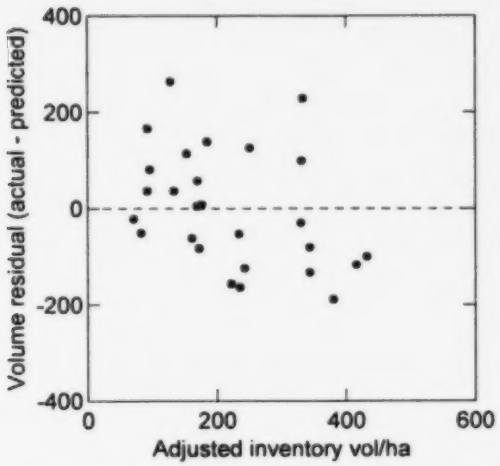

Fig. D7: Volume residual (ground vol/ha – adjusted inventory vol/ha) versus adjusted inventory vol/ha for Fir/Pine/Larch/ Deciduous stratum. Horizontal line represents zero bias. Points above the line represent underestimates whereas points below the line represent overestimates.

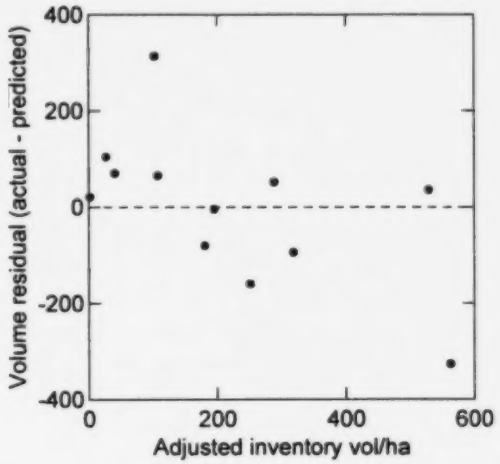

Fig. D8: Volume residual (ground vol/ha – adjusted inventory vol/ha) versus adjusted inventory vol/ha for Cedar/Hemlock stratum. Horizontal line represents zero bias. Points above the line represent underestimates whereas points below the line represent overestimates.

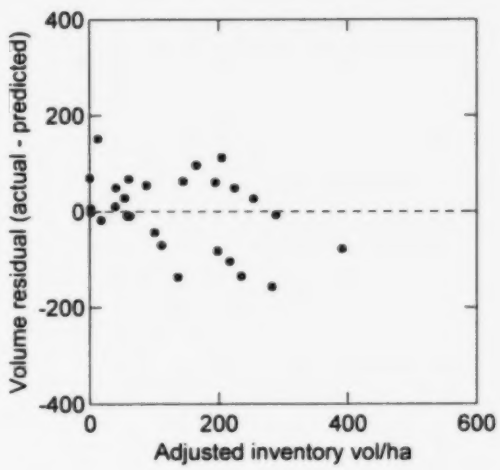

Fig. D9: Volume residual (ground vol/ha – adjusted inventory vol/ha) versus adjusted inventory vol/ha for Balsam stratum. Horizontal line represents zero bias. Points above the line represent underestimates whereas points below the line represent overestimates.

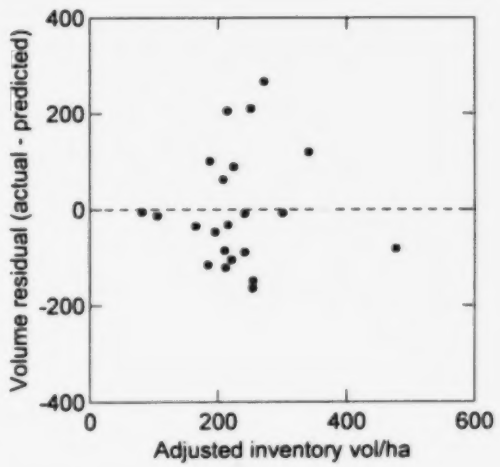

Fig. D10: Volume residual (ground vol/ha – adjusted inventory vol/ha) versus adjusted inventory vol/ha for Spruce stratum. Horizontal line represents zero bias. Points above the line represent underestimates whereas points below the line represent overestimates.

Scatter plots showing volume residuals as a function of adjusted inventory age, by species stratum

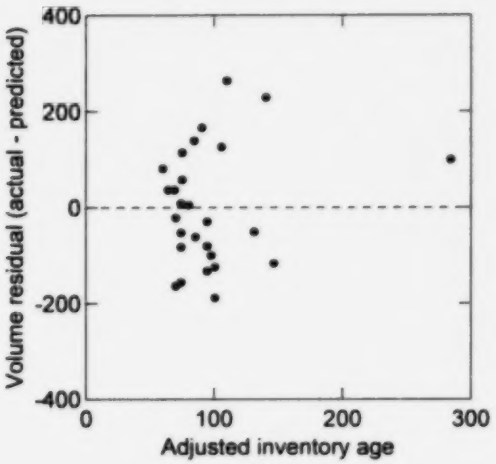

Fig. D11: Volume residual (ground vol/ha – adjusted inventory vol/ha) versus adjusted inventory age for Fir/Pine/Larch/ Deciduous stratum. Horizontal line represents zero bias. Points above the line represent underestimates whereas points below the line represent overestimates.

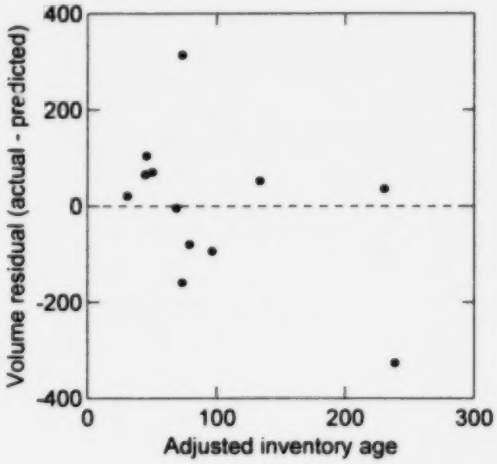

Fig. D12: Volume residual (ground vol/ha – adjusted inventory vol/ha) versus adjusted inventory age for Cedar/Hemlock stratum. Horizontal line represents zero bias. Points above the line represent underestimates whereas points below the line represent overestimates.

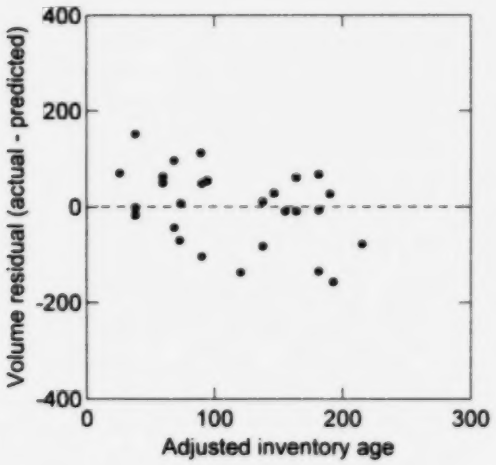

Fig. D13: Volume residual (ground vol/ha – adjusted inventory vol/ha) versus adjusted inventory age for Balsam stratum. Horizontal line represents zero bias. Points above the line represent underestimates whereas points below the line represent overestimates.

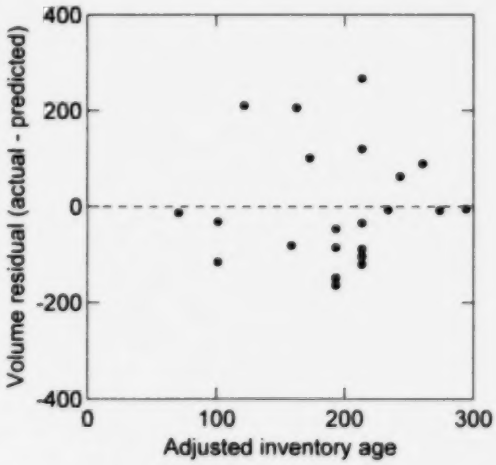

Fig. D14: Volume residual (ground vol/ha – adjusted inventory vol/ha) versus adjusted inventory age for Spruce stratum. Horizontal line represents zero bias. Points above the line represent underestimates whereas points below the line represent overestimates.

Scatter plots showing residuals for Balsam stratum with 2 age group substrata

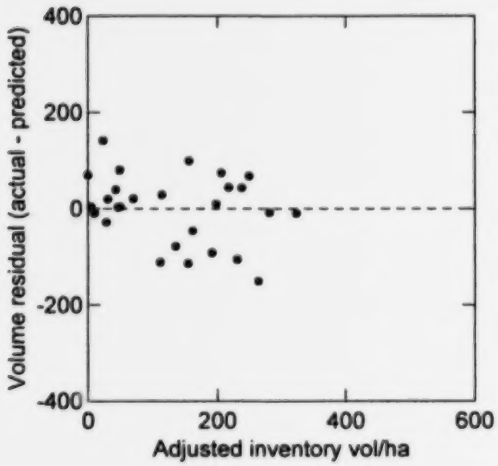

Fig. D15: Volume residual (ground vol/ha – adjusted inventory vol/ha) versus adjusted inventory vol/ha for Balsam strata with 2 age substrata. Horizontal line represents zero bias. Points above the line represent underestimates whereas points below the line represent overestimates.

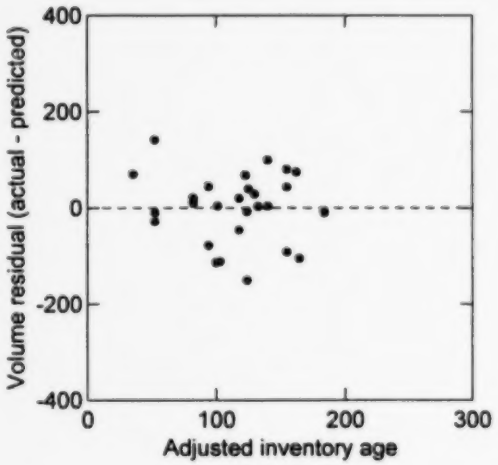

Fig. D16: Volume residual (ground vol/ha – adjusted inventory vol/ha) versus adjusted inventory age for Balsam strata with 2 age substrata. Horizontal line represents zero bias. Points above the line represent underestimates whereas points below the line represent overestimates.

TFL 3 VRI

September 2001

Map Label Attributes

PRJ DATE	Mapsheet No	Polygon No.	Sample	Cluster ID code	Poly Area	type_id	BCL	FIZ	PSYU	rank	Inventory Species Composition	Map lead species	Map 2nd species	Stratum h	Total area in Stratum h	Pct = poly area / total area in stratum h	ITG_NO	Age-in	Ht-in	S_AGE_IN	S_HT_IN
	082F051	2238	0001	3031-0001-QO1	3 7400	2	VTUTCOP	G	303	1	BL 60 SE 40	BL	SE	B	16689 25	0 0002241	20	130 0	18 0	200 0	22 0
	082F061	1902	0002	3031-0002-QO1	6 0000	2	VTUTCOP	G	303	1	B 60 S 30 PL 10	B	S	B	16689 25	0 0003596	20	200 0	27 0	200 0	28 0
	082F071	2011	0003	3031-0003-QO1	104 6200	2	VTUTCDE	G	303	1	PL 100	PL		FPLD	18588 81	0 0056281	28	85 0	24 0	0 0	0 0
	082F061	2462	0005	3031-0005-QO1	7 0800	1	VTUTCSP	G	303	1	B 80 L 20	B	L	B	16689 25	0 0004242	20	35 0	6 0	40 0	9 0
	082F062	1846	0006	3031-0006-QO1	9 0500	1	VTUTCOP	G	303	1	FD 40 PL 30 L 30	FD	PL	FPLD	18588 81	0 0004859	5	95 0	27 0	100 0	25 0
	082F062	1796	0007	3031-0007-QO1	11 0900	1	VTWTCOP	G	303	1	S 40 L 30 H 20 CW 10	S	L	S	15304 99	0 0007246	22	90 0	24 0	100 0	27 0
	082F062	2642	0008	3031-0008-QO1	6 7400	1	VTUTCOP	G	303	1	B 80 S 20	B	S	B	16689 25	0 0004039	20	95 0	21 0	100 0	24 0
	082F051	1571	0010	3031-0010-QO1	21 2900	1	VTUTCOP	G	303	1	H 40 S 30 B 20 CW 10	H	S	CH	8208 61	0 0025936	16	40 0	9 0	40 0	11 0
	082F061	2427	0011	3031-0011-QO1	13 3600	1	VTUTCDE	G	303	1	L 50 CW 30 FD 10 S 10	L	CW	FPLD	18588 81	0 0007167	34	65 0	20 0	65 0	23 0
	082F072	1783	0012	3031-0012-QO1	6 5100	2	VTUTCOP	G	303	1	CW 60 S 30 BL 5 HW 5	CW	S	CH	8208 61	0 0007931	11	240 0	38 0	240 0	38 0
	082F062	1611	0013	3031-0013-QO1	9 8200	2	VTUTCOP	G	303	1*see note	L 80 FD 20	L	FD	FPLD	18588 81	0 0005263	33	270 0	40 0	250 0	35 0
	082F062	2311	0014	3031-0014-QO1	70 2300	1	VTUTCDE	G	303	1	L 60 PL 20 FD 15 EP 5	L	PL	FPLD	18588 81	0 0037781	34	65 0	26 0	65 0	24 0
	082F071	2173	0015	3031-0015-QO1	45 3100	1	VTUTCDE	G	303	1	L 50 FD 40 PW 10	L	FD	FPLD	18588 81	0 0024375	33	65 0	23 0	65 0	23 0
	082F061	1863	0016	3031-0016-QO1	29 8000	1	VTUTCSP	G	303	1	S 60 B 40	S	B	S	15304 99	0 0019471	24	60 0	18 0	60 0	13 0
	082F062	1864	0017	3031-0017-QO1	36 9800	2	VTUTCDE	G	303	1	FD 80 CW 10 L 5 H 5	FD	CW	FPLD	18588 81	0 0019894	2	130 0	31 0	100 0	27 0
	082F073	1526	0020	3031-0020-QO1	7 3100	1	VTUTMOP	G	303	1	AT 50 PL 25 FD 10 EP 10 S 5	AT	PL	FPLD	18588 81	0 0003932	41	60 0	18 0	70 0	20 0
	082F071	2011	0021	3031-0021-QO1	104 6200	2	VTUTCDE	G	303	1	PL 100	PL		FPLD	18588 81	0 0056281	28	85 0	24 0	0 0	0 0
	082F051	1901	0022	3031-0022-QO1	10 1200	2	VTUTCSP	G	303	1	S 80 B 20	S	B	S	15304 99	0 0006612	24	180 0	30 0	160 0	22 0
	082F072	1727	0023	3031-0023-QO1	4 4500	2	VTUTCOP	G	303	1	SE 90 BL 10	SE	BL	S	15304 99	0 0002908	21	200 0	30 0	150 0	24 0
	082F061	2561	0024	3031-0024-QO1	34 2800	1	VTUTCOP	G	303	1	S 30 FD 20 B 20 PL 20 L 10	S	FD	S	15304 99	0 0022368	22	90 0	27 0	150 0	24 0
	082F052	1768	0025	3031-0025-QO1	3 9400	2	VTUTCOP	G	303	1	S 50 B 50	S	B	S	15304 99	0 0002574	24	200 0	30 0	180 0	24 0
	082F051	1905	0027	3031-0027-QO1	37 5400	2	VTUTCOP	G	303	1	S 60 B 40	S	B	S	15304 99	0 0024528	24	180 0	34 0	160 0	20 0
	082F062	2442	0028	3031-0028-QO1	8 1500	1	VTUTCOP	G	303	1	FD 60 PL 30 S 10	FD	PL	FPLD	18588 81	0 0004384	5	90 0	24 0	90 0	21 0
	082F061	1894	0029	3031-0029-QO1	22 5700	1	VTUTCSP	G	303	1	B 60 PL 30 S 10	B	PL	B	16689 25	0 0013524	20	75 0	16 0	75 0	16 0
	082F081	1589	0030	3031-0030-QO1	45 9300	2	VTUTCOP	G	303	1	BL 80 S 20	BL	S	B	16689 25	0 0027521	20	211 0	24 5	220 0	27 0
	082F071	2094	0031	3031-0031-QO1	8 2000	2	VTUTCOP	G	303	1	S 50 B 50	S	B	S	15304 99	0 0005358	24	200 0	32 0	180 0	27 0
	082F063	1505	0032	3031-0032-QO1	44 7100	1	VTUTCOP	G	303	1	B 50 S 30 PL 20	B	S	B	16689 25	0 0026790	20	70 0	18 0	75 0	20 0
	082F051	2220	0033	3031-0033-QO1	5 5400	2	VTUTCSP	G	303	1	B 70 S 30	B	S	B	16689 25	0 0003320	20	170 0	18 0	200 0	18 0
	082F061	2466	0034	3031-0034-QO1	38 8400	1	VTUTCDE	G	303	1	L 80 B 10 S 10	L	B	FPLD	18588 81	0 0020804	34	65 0	23 0	60 0	18 0
	082F051	2036	0035	3031-0035-QO1	13 3400	2	VTUTCSP	G	303	1	B 60 S 35 PW 5	B	S	B	16689 25	0 0007993	20	200 0	26 0	200 0	26 0
	082F051	2045	0036	3031-0036-QO1	58 2600	2	VTUTCOP	G	303	1	BL 80 SE 20	BL	SE	B	16689 25	0 0034909	20	150 0	14 0	150 0	16 0
	082F061	2019	0037	3031-0037-QO1	9 8400	2	VTUTCOP	G	303	1	B 90 S 10	B	S	B	16689 25	0 0005896	18	180 0	21 0	180 0	25 0
	082F063	1556	0038	3031-0038-QO1	8 0600	1	VTUTCOP	G	303	1	S 70 L 20 B 10	S	L	S	15304 99	0 0005266	22	110 0	29 0	120 0	32 0
	082F072	2166	0039	3031-0039-QO1	12 2100	2	VTUTCOP	G	303	1	S 55 B 30 PL 15	S	B	S	15304 99	0 0007978	24	247 0	30 3	200 0	24 0
	082F071	1690	0040	3031-0040-QO1	51 3500	2	VTUTCOP	G	303	1	S 70 B 30	S	B	S	15304 99	0 0033551	24	180 0	27 0	180 0	25 0
	082F072	2295	0041	3031-0041-QO1	19 6600	2	VTUTCOP	G	303	1	S 60 B 40	S	B	S	15304 99	0 0012845	24	260 0	32 0	230 0	25 0
	082F052	1558	0042	3031-0042-QO1	10 5500	1	VTUTCOP	G	303	1	L 60 FD 40	L	FD	FPLD	18588 81	0 0005675	33	100 0	22 0	100 0	22 0
	082F061	1782	0043	3031-0043-QO1	58 2100	1	VTUTCDE	G	303	1	H 50 CW 40 S 10	H	CW	CH	8208 61	0 0070913	14	40 0	14 0	40 0	14 0
	082F082	1508	0044	3031-0044-QO1	26 8500	2	VTUTCSP	G	303	1	B 70 S 30	B	S	B	16689 25	0 0016088	20	180 0	18 0	180 0	20 0
	082F071	1611	0045	3031-0045-QO1	82 5300	1	VTUTCSP	G	303	1	B 90 S 10	B	S	B	16689 25	0 0049461	18	100 0	14 0	140 0	19 0
	082F052	1937	0046	3031-0046-QO1	76 1800	1	VTUTCDE	G	303	1	H 60 CW 30 FD 10	H	CW	CH	8208 61	0 0092805	14	70 0	14 0	70 0	16 0
	082F061	1909	0047	3031-0047-QO1	18 7300	2	VTUTCOP	G	303	1	B 60 S 40	B	S	B	16689 25	0 0011223	20	150 0	22 0	150 0	24 0
	082F052	1599	0048	3031-0048-QO1	12 9600	1	VTUTCDE	G	303	1	LW 80 FD 20	LW	FD	FPLD	18588 81	0 0008972	33	80 0	20 0	80 0	24 0
	082F052	1910	0049	3031-0049-QO1	40 5600	2	VTUTCDE	G	303	1	H 70 CW 20 PW 10	H	CW	CH	8208 61	0 0049412	14	135 0	24 0	135 0	28 0
	082F052	1574	0051	3031-0051-QO1	61 7200	1	VTUTCDE	G	303	1	L 60 FD 30 PW 5 CW 5	L	FD	FPLD	18588 81	0 0033203	33	65 0	32 0	80 0	30 0
	082F072	44	0052	3031-0052-QO1	40 1600	1	VTUTCSP	G	303	1	BL 70 SE 30	BL	SE	B	16689 25	0 0024063	20	80 0	7 0	80 0	7 3
	082F071	1982	0053	3031-0053-QO1	98 6900	1	VTUTCDE	G	303	1	L 55 FD 25 S 15 H 5	L	FD	FPLD	18588 81	0 0053091	33	65 0	23 0	65 0	23 0
	082F061	1505	0055	3031-0055-QO1	20 7700	2	VTUTCOP	G	303	1	S 50 B 50	S	B	S	15304 99	0 0013571	24	220 0	37 0	220 0	27 0
	082F071	1647	0057	3031-0057-QO1	38 3800	1	VTUTCOP	G	303	1	FD 60 S 20 L 15 H 5	FD	S	FPLD	18588 81	0 0020847	4	70 0	21 0	75 0	19 0
	082F072	1963	0058	3031-0058-QO1	5 6900	2	VTUTCOP	G	303	1	S 50 B 50	S	B	S	15304 99	0 0003716	24	200 0	26 0	175 0	21 0
	082F062	2238	0059	3031-0059-QO1	28 8600	1	VTUTCOP	G	303	1	B 70 S 30	B	S	B	16689 25	0 0017293	20	95 0	21 0	100 0	24 0
	082F051	1926	0060	3031-0060-QO1	17 5700	2	VTUTCOP	G	303	1	H 60 S 20 CW 20	H	S	CH	8208 61	0 0021404	16	250 0	35 0	180 0	35 0
	082F072	1586	0061	3031-0061-QO1	22 2600	2	VTUTCSP	G	303	1	BL 60 SE 40	BL	SE	B	16689 25	0 0013336	20	200 0	18 0	200 0	25 0
	082F051	1534	0062	3031-0062-QO1	47 0600	2	VTUTCOP	G	303	1	S 60 CW 20 H 10 B 10	S	CW	S	15304 99	0 0030746	23	146 0	44 0	250 0	38 0
	082F061	1524	0063	3031-0063-QO1	46 9300	1	VTUTCOP	G	303	1	L 50 H 40 B 10	L	H	FPLD	18588 81	0 0025246	34	55 0	18 0	55 0	18 0
	082F071	1511	0064	3031-0064-QO1	39 8000	2	VTUTCOP	G	303	1	B 70 S 30	B	S	B	16689 25	0 0023846	20	240 0	34 0	240 0	34 0
	082F061	1592	0065	3031-0065-QO1	55 5100	1	VTUTCSP	G	303	1	B 70 S 20 PL 10	B	S	B	16689 25	0 0033261	20	70 0	15 0	70 0	19 0
	082F072	1704	0066	3031-0066-QO1	5 0500	1	VTUTCOP	G	303	1	BL 90 SE 10	BL	SE	B	16689 25	0 0003026	18	35 0	5 0	40 0	6 0
	082F061	2106	0067	3031-0067-QO1	7 0300	2	VTUTCOP	G	303	1	FD 40 H 40 CW 10 L 10	FD	H	FPLD	18588 81	0 0003782	3	135 0	31 0	80 0	26 0
	082F071	2139	0068	3031-0068-QO1	5 3600	2	VTUTCOP	G	303	1	S 90 B 10	S	B	S	15304 99	0 0003502	21	200 0	37 0	150 0	27 0
	082F051	2082	0069	3031-0069-QO1	44 1000	2	VTUTCOP	G	303	1	S 70 B 30	S	B	S	15304 99	0 0028814	24	230 0	27 0	200 0	25 0

	September 2001																						
											Map Label Attributes												
PRJ DATE	Mapsheet No.	Polygon No.	Sample	Cluster ID code	Poly Area	type_id	BCL	FIZ	PSYU	rank	Inventory Species Composition	Map lead species	Map 2nd species	Stratum h	Total area in Stratum h	Pct = poly area / total area in stratum h	ITG_NO	Age-in	Ht-in	S_AGE_IN	S_HT_IN
	082F062	1740	0070	3031-0070-QO1	35 6700	1	VTUTMDE	G	303	1	EP 55 FD 20 PL 10 L 10 S 5	EP	FD	FPLD	18588 81	0 0019189	40	60 0	19 5	50 0	18 0
	082F071	2158	0071	3031-0071-QO1	27 5700	1	VTUTCDE	G	303	1	H 40 L 30 PL 10 FD 10 CW 10	H	L	CH	8208 61	0 0033587	13	70 0	23 0	70 0	23 0
	082F061	1523	0072	3031-0072-QO1	107 5400	1	VTUTCDE	G	303	1	L 50 FD 25 CW 10 HW 10 PW 5	L	FD	FPLD	18588 81	0 0057852	33	65 0	25 0	65 0	25 0
	082F071	1664	0073	3031-0073-QO1	43 3000	1	VTUTCOP	G	303	1	FD 50 PL 30 L 10 S 10	FD	PL	FPLD	18588 81	0 0023294	5	75 0	21 0	75 0	21 0
	082F051	1703	0074	3031-0074-QO1	4 2800	2	VTUTCSP	G	303	1	FD 90 SE 10	FD	SE	FPLD	18588 81	0 0002302	1	120 0	24 0	120 0	20 0
	082F061	2735	0075	3031-0075-QO1	28 6300	2	VTUTCSP	G	303	1	B 90 S 10	B	S	B	16689 25	0 0017155	18	160 0	18 0	160 0	19 0
	082F072	1683	0076	3031-0076-QO1	59 4400	2	VTUTCSP	G	303	1	S 80 BL 20	S	BL	S	15304 99	0 0038837	24	280 0	30 0	200 0	21 0
	082F071	1783	0077	3031-0077-QO1	166 2600	2	VTUTCOP	G	303	1	S 60 B 30 PL 10	S	B	S	15304 99	0 0108531	24	180 0	32 0	150 0	26 0
	082F062	2241	0078	3031-0078-QO1	4 4200	2	VTUTCOP	G	303	1	S 80 B 20	S	B	S	15304 99	0 0002888	24	150 0	28 0	150 0	25 0
	082F052	1511	0079	3031-0079-QO1	7 5100	2	VTUTCOP	G	303	1	S 60 B 40	S	B	S	15304 99	0 0004907	24	160 0	27 0	160 0	25 0
	082F072	1996	0080	3031-0080-QO1	6 8200	2	VTUTCSP	G	303	1	S 70 B 20 H 10	S	B	S	15304 99	0 0004456	24	200 0	35 0	175 0	27 0
	082F062	2368	0081	3031-0081-QO1	160 1800	1	VTUTCDE	G	303	1	FD 45 L 25 PL 15 PY 15	FD	L	FPLD	18588 81	0 0086170	7	91 0	31 5	91 0	33 0
	082F061	1924	0082	3031-0082-QO1	24 8900	1	VTUTCOP	G	303	1	H 40 CW 30 L 20 FD 10	H	CW	CH	8208 61	0 0030322	14	45 0	11 0	45 0	11 0
	082F062	1687	0083	3031-0083-QO1	45 3500	1	VTUTCDE	G	303	1	FD 89 CW 11	FD	CW	FPLD	18588 81	0 0024396	1	88 0	33 0	80 0	27 0
	082F061	1919	0084	3031-0084-QO1	26 2200	1	VTUTCDE	G	303	1	H 40 L 30 FD 20 CW 10	H	L	CH	8208 61	0 0031942	13	65 0	20 0	60 0	18 0
	082F072	1868	0085	3031-0085-QO1	12 3800	1	VTUTCOP	G	303	1	B 60 PL 30 S 10	B	PL	B	16689 25	0 0007406	20	60 0	10 0	60 0	12 0
	082F062	2242	0087	3031-0087-QO1	98 0300	1	VTUTCOP	G	303	1	B 50 S 40 PL 10	B	S	B	16689 25	0 0058738	20	95 0	22 0	100 0	25 0
	082F061	1929	0088	3031-0088-QO1	24 0400	1	VTUTCDE	G	303	1	PW 50 L 30 H 10 CW 10	PW	L	FPLD	18588 81	0 0012933	27	60 0	21 0	50 0	15 0
	082F062	2330	0089	3031-0089-QO1	42 7000	1	VTUTCOP	G	303	1	FD 90 EP 10	FD	EP	FPLD	18588 81	0 0022971	1	75 0	24 0	75 0	21 0
	082F061	2472	0090	3031-0090-QO1	6 2100	1	VTUTCDE	G	303	1	L 80 CW 10 FD 10	L	CW	FPLD	18588 81	0 0003341	34	50 0	18 0	50 0	18 0
	082F061	2213	0091	3031-0091-QO1	23 1200	1	VTUTCOP	G	303	1	B 60 PL 30 FD 10	B	PL	B	16689 25	0 0013853	20	60 0	17 0	60 0	15 0
	082F072	1689	0092	3031-0092-QO1	81 2000	1	VTUTCSP	G	303	1	BL 100	BL		B	16689 25	0 0048654	18	35 0	6 0	0 0	0 0
	082F081	1590	0093	3031-0093-QO1	30 5500	2	VTUTCOP	G	303	1	BL 76 S 24	BL	S	B	16689 25	0 0018305	20	214 0	27 7	220 0	32 0
	082F062	2556	0105	3031-0105-QO1	17 0700	1	VTUTCDE	G	303	1	H 50 FD 20 CW 20 L 10	H	FD	CH	8208 61	0 0020795	13	95 0	26 0	95 0	30 0
	082F051	12	0501	3031-0501-QO1	22 4500	1	VTUTCSP	G	303	1	BL 50 SE 40 HW 10	BL	SE	B	16689 25	0 0013452	20	22 0	2 6	22 0	6 0
	082F052	79	0503	3031-0503-QO1	9 9200	1	VTUTCOP	G	303	1	CW 60 EP 10 AT 10 HW 10 FD 10	CW	EP	CH	8208 61	0 0012085	10	80 0	21 0	80 0	21 0
	082F052	43	0504	3031-0504-QO1	21 6200	1	VTUTCOP	G	303	1	HW 37 CW 32 SE 15 BL 12 FD 4	HW	CW	CH	8208 61	0 0026338	14	26 0	9 3	26 0	9 0

Projected S_AGE (edetools)	Projected S_HT (edetools)	Age-prj 2001	Ht-prj 2001	Site Index	CRWN_CLS	Proj'd STK CLS	Map Label Volume (VDYP Projected)			Ground (Audit) Attributes: SPECIES % by BA at 4 cm + dbh utilization	Basal area/ha (live) 4cm+ dbh utilin.	SPECIES % by BA at 7.5 cm + dbh utilization	Basal area/ha (live) 7.5 cm+ dbh utilin.	SPECIES % by BA at 12.5 cm + dbh utilization	Basal area/ha (live) 12.5 cm+ dbh utilin.
								less dwb							
							12.5	17.5	"mir"						
		139.0	18.9	10.2	30	1	153.1	138.3	138.3	Bl 97 Pa 03	4.09	Bl 100	2.77		0.00
		209.0	27.6	11.7	50	1	290.7	281.9	281.9	Hw 61 Se 22 Fd 11 Bl 06	42.00	Hw 59 Se 24 Fd 12 Bl 05	42.00	Hw 59 Se 24 Fd 12 Bl 05	39.67
		93.0	24.9	19.5	70	3	321.3	243.6	321.3	Pl 100	40.60	Pl 100	40.60	Pl 100	36.40
		44.0	8.3	13.2	20	0	41.4	18.9	18.9	S 50 Bl 31 Hw 16 Fd 01 Tw 01 Cw 01	19.68	S 52 Bl 32 Hw 16	19.19	S 56 Bl 35 Hw 09	17.61
		104.0	28.4	19.3	50	0	245.9	231.2	231.2	Fd 78 Cw 10 Pl 10 Py 02	56.00	Fd 82 Pl 11 Cw 05 Py 02	53.20	Fd 82 Pl 11 Cw 05 Py 02	53.20
		99.0	25.7	17.7	30	0	280.3	261.2	261.2	Cw 75 S 13 Pw 12	14.00	Cw 75 S 13 Pw 12	14.00	Cw 75 S 13 Pw 12	14.00
		104.0	22.5	14.9	40	0	223.1	210.1	210.1	Bl 73 S 27	30.80	Bl 70 S 30	28.00	Bl 57 S 43	19.60
		49.0	11.6	14.5	50	0	76.7	44.6	44.6	Hw 44 Bl 31 Cw 19 S 06	28.00	Bl 42 Cw 25 Hw 25 S 08	21.00	Bl 45 Cw 27 Hw 18 S 10	19.25
74.0	25.3	74.0	22.2	18.3	70	0	186.3	159.5	159.5	Cw 39 Lw 24 Bl 20 Hw 12 Sx 05	68.60	Cw 38 Lw 27 Bl 22 Hw 09 S	63.00	Cw 33 Lw 31 Bl 26 Hw 05 S	54.60
		249.0	38.5	18.2	30	1	579.1	574.2	574.2	Cw 88 S 12	100.00	Cw 88 S 12	100.00	Cw 88 S 12	100.00
		73.0	28.1	21.3	40	1	315.5	315.5	315.5	Fd 81 Bl 08 Lw 04 S 04 Cw 03	67.20	Fd 81 Bl 08 Lw 04 S 04 Cw	67.20	Fd 82 Bl 09 Lw 04 Cw 02 S	63.00
		73.0	28.1	23.6	70	0	253	225.7	225.7	Cw 46 Hw 38 Fd 08 Lw 08	22.75	Hw 45 Cw 36 Fd 09 Lw 10	19.25	Hw 50 Fd 17 Cw 17 Lw 16	10.50
		73.0	25.0	20.9	75	0	206.8	176.6	176.6	Hw 57 Fd 19 Cw 11 Se 05 Lw 05 Pw 03	51.80	Hw 56 Fd 26 Cw 11 Lw 07	37.80	Hw 45 Fd 27 Lw 18 Cw 10	15.40
		69.0	20.8	19.2	20	0	172.6	155.9	155.9	Se 56 Bl 44	16.00	Se 56 Bl 44	16.00	Se 56 Bl 44	16.00
108.0	28.2	138.0	31.9	18.8	65	1	332.3	327.1	327.1	Cw 40 Fd 27 Hw 27 S 06	72.00	Cw 40 Fd 27 Hw 27 S 06	72.00	Cw 37 Fd 30 Hw 26 S 07	64.80
79.0	21.3	69.0	19.5	16.8	30	0	88.5	73	73	Fd 60 Ep 20 Pl 20	6.25	Fd 60 Ep 20 Pl 20	6.25	Fd 60 Ep 20 Pl 20	6.25
		93.0	24.9	19.5	70	3	321.3	243.6	321.3	Pl 100	40.60	Pl 100	39.20	Pl 100	33.60
169.0	22.8	189.0	30.6	13.5	20	1	302.9	297.6	297.6	Bl 100	18.33	Bl 100	18.33	Bl 100	15.00
		209.0	30.6	12.3	40	1	348.5	341.4	341.4	Se 53 Bl 47	21.00	Se 53 Bl 47	21.00	Se 53 Bl 47	21.00
		99.0	28.7	20.3	40	0	318.1	301.6	301.6	Bl 47 Se 41 Hw 06 Fd 06	30.60	Bl 47 Se 41 Hw 06 Fd 06	30.60	Se 50 Bl 36 Hw 07 Fd 07	25.20
189.0	24.7	209.0	30.6	12.3	40	1	302.6	295.5	295.5	Bl 92 Se 08	16.80	Bl 92 Se 08	16.80	Bl 91 Se 09	15.40
169.0	20.7	189.0	34.6	17.1	35	1	357.6	353.3	353.3	Bl 85 Se 15	18.20	Bl 85 Se 15	18.20	Bl 83 Se 17	16.80
		99.0	25.4	17.8	60	0	251.8	233.5	233.5	Se 31 Lw 25 Fd 19 Bl 13 Pw 05 Cw 05	22.40	Se 31 Lw 25 Fd 19 Bl 13 Pw	22.40	Se 33 Lw 27 Fd 20 Bl 13 Pw	21.00
84.0	17.1	84.0	17.6	13.9	10	0	131.7	116.5	116.5	Pl 56 Fd 33 S 11	9.00	Pl 56 Fd 33 S 11	9.00	Pl 56 Fd 33 S 11	9.00
		219.0	25.0	10.2	40	1	257.6	249.9	249.9	Bl 67 Se 33	46.00	Bl 67 Se 33	46.00	Bl 66 Se 34	44.00
189.0	27.7	209.0	32.5	14.0	30	1	311.3	307.1	307.1	Bl 79 Se 14 Pa 07	23.33	Bl 85 Se 15	21.67	Bl 85 Se 15	21.67
		79.0	19.9	16.3	50	0	189	168.3	168.3	Bl 74 S 22 Lw 04	37.80	Bl 73 S 23 Lw 04	36.40	Bl 70 S 26 Lw 04	32.20
		179.0	18.6	8.5	10	2	73.3	59.1	59.1	Bl 100 Se tr	14.89	Bl 100	14.71	Bl 100	14.29
		74.0	25.3	20.9	70	0	199.1	172.8	172.8	Cw 42 Lw 27 Bl 19 Hw 08 Fd 04	46.80	Cw 42 Lw 27 Bl 19 Hw 08 F	46.80	Cw 40 Lw 28 Bl 20 Hw 08 F	45.00
		209.0	26.6	11.3	25	1	235.1	228.5	228.5	Bl 74 Se 16 Pa 05 Hm 05	26.60	Bl 74 Se 16 Pa 05 Hm 05	26.60	Bl 76 Se 18 Pa 06	23.80
159.0	17.0	159.0	14.6	7.3	10	2	56.4	42	42	Se 49 Bl 47 Pa 04	11.02	Se 51 Bl 45 Pa 04	10.09	Se 64 Bl 30 Pa 06	7.30
		189.0	21.6	9.6	40	1	205.4	194	194	Bl 57 Se 38 Pa 05	36.75	Bl 55 Se 40 Pa 05	35.00	Bl 55 Se 40 Pa 05	35.00
		119.0	30.3	18.9	55	0	369.2	354.8	354.8	Cw 26 Hw 26 Bl 21 S 18 Lw 09	61.20	Hw 27 Cw 24 Bl 21 S 18 Lw	59.40	Hw 28 Cw 22 Bl 22 S 19 Lw	57.60
208.0	24.5	255.0	30.7	10.2	45	1	321.9	316.2	316.2	Bl 55 S 31 Pl 14	71.40	Bl 55 S 31 Pl 14	71.40	Bl 54 S 32 Pl 14	70.00
189.0	25.7	189.0	27.7	11.1	45	1	286.8	276.3	276.3	Bl 39 Pl 36 Se 25	25.15	Pl 37 Bl 37 Se 26	24.38	Pl 38 Bl 35 Se 27	23.80
238.0	25.4	268.0	32.3	11.2	50	1	345.8	339.8	339.8	Bl 74 Se 26	32.20	Bl 74 Se 26	32.20	Bl 71 Se 29	29.40
		108.0	23.1	14.3	50	0	151.8	133.4	133.4	Cw 39 Fd 18 Lw 12 Se 12 Bl 06 Pw 06 Hw	59.40	Cw 39 Fd 18 Lw 12 Se 12 E	59.40	Cw 35 Fd 19 Lw 13 Se 13 E	55.80
		48.0	17.0	19.7	70	0	163.1	126.9	126.9	Cw 48 Hw 42 Fd 06 Lw 04	43.40	Cw 46 Hw 43 Fd 07 Lw 04	39.20	Cw 62 Hw 24 Fd 10 Lw 04	29.40
		189.0	18.6	8.2	25	2	78.8	63.5	63.5	Bl 87 Se 13	15.00	Bl 85 Se 15	13.00	Bl 91 Se 09	11.00
		109.0	15.0	9.8	10	0	108	90.2	90.2	Bl 73 P 14 Se 13	30.80	Bl 71 P 14 Se 15	29.40	Bl 70 P 15 Se 15	28.00
79.0	17.5	79.0	15.8	12.3	80	0	156	122.3	122.3	Cw 51 Hw 46 S 03	66.60	Cw 51 Hw 46 S 03	66.60	Cw 50 Hw 47 S 03	61.20
		159.0	22.8	11.3	40	1	209.3	196.7	196.7	Bl 60 Se 40	31.25	Bl 57 Se 43	28.75	Se 56 Bl 44	22.50
		89.0	21.7	15.5	70	0	129.6	104.8	104.8	Hw 35 Lw 20 Fd 15 Pl 15 Ep 05 Cw 05 Pw	60.00	Hw 33 Lw 22 Pl 17 Fd 11 E	54.00	Lw 27 Hw 20 Pl 20 Fd 13 C	45.00
		144.0	24.9	12.4	70	1	340.2	313.9	313.9	Hw 59 Cw 37 Pw 04	48.60	Hw 58 Cw 38 Pw 04	46.80	Hw 58 Cw 38 Pw 04	46.80
88.0	31.9	93.0	33.6	24.5	70	0	340.9	318.2	318.2	Fd 58 Cw 29 Lw 08 Hw 05	42.00	Fd 58 Cw 29 Lw 08 Hw 05	42.00	Fd 64 Cw 27 Lw 09	36.50
		85.0	7.4	6.3	5	0	10.6	3.7	3.7	Bl 92 S 08	4.78	Bl 94 S 06	4.57	Bl 100	3.83
		73.0	25.0	20.9	70	0	209.2	179.2	179.2	Lw 33 Fd 29 Hw 19 Cw 19	37.80	Lw 37 Fd 32 Hw 16 Cw 15	34.20	Lw 39 Fd 28 Hw 17 Cw 16	32.40
229.0	27.6	229.0	37.4	18.1	55	1	418.7	413.9	413.9	Bl 70 Se 30	48.60	Bl 70 Se 30	48.60	Bl 68 Se 32	45.00
		79.0	22.9	18.5	35	0	194.8	166.2	166.2	Fd 67 Pl 25 S 04 Pw 04	33.60	Fd 67 Pl 25 S 04 Pw 04	33.60	Fd 67 Pl 24 S 05 Pw 04	29.40
184.0	21.7	209.0	26.7	9.2	30	1	241.3	232.5	232.5	Bl 67 Se 33	21.00	Bl 67 Se 33	21.00	Bl 60 Se 40	17.50
		103.0	22.3	14.9	50	0	213.3	198.3	198.3	Bl 79 S 21	52.20	Bl 79 S 21	52.20	Bl 75 S 25	43.20
		258.0	35.3	15.3	50	1	606.4	595.1	595.1	Hw 75 S 13 Cw 08 Bl 04	43.20	Hw 75 S 13 Cw 08 Bl 04	43.20	Hw 74 S 13 Cw 09 Bl 04	41.40
		209.0	18.5	7.7	20	2	77.1	62.1	62.1	Bl 50 Se 30 Tw 20	20.00	Bl 47 Se 32 Tw 21	19.00	Bl 60 Se 40	15.00
259.0	38.5	155.0	44.6	29.7	60	1	577.8	568.8	568.8	Cw 45 Hw 30 Se 20 Bl 05	64.00	Cw 45 Hw 30 Se 20 Bl 05	64.00	Cw 45 Hw 30 Se 20 Bl 05	64.00
		63.0	20.2	19.0	60	0	173.2	140	140	Bl 37 Hw 23 Se 23 Lw 10 Pl 03 Fd 04	42.00	Bl 41 Se 22 Hw 19 Lw 11 Pl	37.80	Bl 43 Se 18 Hw 14 Lw 14 Pl	29.40
248.0	34.3	248.0	34.5	13.8	50	1	386	381	381	Se 57 Bl 43	39.20	Se 57 Bl 43	39.20	Se 59 Bl 41	37.80
		79.0	16.7	13.8	10	0	122	105.3	105.3	Bl 52 Se 48	10.86	Se 51 Bl 49	9.46	Se 58 Bl 42	6.72
		44.0	7.0	11.7	30	0	33	9	9	Bl 100	20.21	Bl 100	14.63	Bl 100	4.94
89.0	27.8	144.0	31.9	18.5	50	1	412.2	395.5	395.5	Hw 68 Cw 32	45.00	Hw 68 Cw 32	45.00	Hw 68 Cw 32	45.00
		209.0	37.4	19.1	50	1	480	475.9	475.9	Se 67 Bl 33	45.00	Se 67 Bl 33	45.00	Se 67 Bl 33	45.00
		238.0	27.5	8.5	60	1	303.7	292.7	292.7	Se 50 Bl 44 P 06	38.40	Se 50 Bl 44 P 06	38.40	Se 50 Bl 44 P 06	38.40

Projected S_AGE (siteTools)	Projected S_HT (siteTools)	Age-proj 2001	Ht-proj 2001	Site Index	CRWN_CLS	Proj'd STK CLS	Map Label Volume (VDYP Projected) 12.5	17.5	"mbr"	Ground (Audit) Attributes SPECIES % by BA at 4 cm + dbh utilization	Basal area/ha (live) 4cm+ dbh utiln.	SPECIES % by BA at 7.5 cm + dbh utilization	Basal area/ha (live) 7.5 cm+ dbh utiln.	SPECIES % by BA at 12.5 cm + dbh utilization	Basal area/ha (live) 12.5 cm+ dbh utiln.
		66.0	20.9	18.1	65.0		119.4	101	101	Ep 35 Hw 17 Pl 17 Lw 13 Cw 09 Fd 09	23.00	Ep 32 Hw 18 Pl 18 Lw 14 C	22.00	Ep 24 Pl 24 Lw 18 Hw 12 Fd	17.00
		79.0	25.1	19.2	70.0		305.3	274.6	274.6	Hw 40 Fd 32 Se 16 Cw 08 Lw 04	35.00	Fd 40 Hw 35 Se 20 Lw 05	28.00	Fd 42 Hw 32 Se 21 Lw 05	26.60
73.0	27.2	73.0	27.1	22.7	80.0		256.4	222.9	222.9	Fd 44 Hw 22 Cw 15 Lw 15 Sx 04	37.80	Fd 44 Hw 22 Cw 15 Lw 15 S	37.80	Fd 50 Cw 17 Lw 17 Hw 13 S	33.60
84.0	22.3	84.0	22.7	17.6	40.0		177.2	154.2	154.2	Pl 38 Cw 19 Fd 19 Se 19 Ac 05	18.00	Pl 40 Cw 20 Se 20 Fd 13 A	15.00	Pl 43 Se 21 Fd 14 Cw 14 Ac	14.00
		129.0	24.9	15.1	10.2		79.9	78.1	78.1	Fd 86 Bl 14	7.00	Fd 86 Bl 14	7.00	Fd 86 Bl 14	7.00
169.0	19.9	169.0	16.6	7.9	10.2		71.9	55.9	55.9	Se 86 Bl 14	15.68	Se 86 Bl 14	15.88	Se 92 Bl 08	14.63
208.0	21.5	268.0	30.4	8.7	15.2		128.2	117.1	117.1	Bl 76 S 24	23.80	Bl 75 S 25	22.40	Bl 73 S 27	21.00
159.0	26.9	189.0	32.6	15.3	50.1		361.3	354	354	Bl 58 Se 35 Cw 07	31.00	Bl 59 Se 34 Cw 07	29.00	Bl 59 Se 32 Cw 09	22.00
		159.0	28.9	14.0	45.1		313.6	302.9	302.9	S 66 Bl 35	46.67	S 65 Bl 35	46.67	S 65 Bl 35	46.67
		169.0	27.8	12.4	40.1		274.1	263.8	263.8	Se 76 Hw 20 Bl 04	31.25	Se 76 Hw 20 Bl 04	31.25	Se 76 Hw 20 Bl 04	31.25
		209.0	35.5	17.0	25.1		380.9	377.7	377.7	Se 41 Hw 36 Bl 14 Pw 05 Cw 04	52.80	Se 43 Hw 38 Bl 14 Pw 05	50.40	Se 43 Hw 38 Bl 14 Pw 05	50.40
		99.0	33.1	23.1	70.0		360.3	349	349	Cw 62 Fd 23 Hw 08 Lw 07	23.40	Cw 62 Fd 23 Hw 08 Lw 07	23.40	Cw 58 Fd 25 Hw 08 Lw 09	21.60
		54.0	13.6	15.0	55.0		81.3	53.1	53.1	Hw 71 Sx 19 Fd 08 Cw 04	74.40	Hw 75 Fd 10 Sx 10 Cw 05	48.00	Hw 60 Fd 20 Sx 20	24.00
		96.0	34.7	24.7	70.0		404.1	401.4	401.4	Fd 70 Cw 17 Ep 09 Py 04	41.40	Fd 70 Cw 17 Ep 09 Py 04	41.40	Fd 76 Cw 14 Ep 05 Py 05	37.80
69.0	20.3	74.0	22.2	17.8	65.0		246	216.1	216.1	Lw 31 Hw 21 Fd 17 Cw 14 Se 14 Bl 03	40.60	Lw 38 Fd 21 Cw 17 Se 17 E	33.60	Lw 41 Cw 18 Fd 18 Se 14 E	30.80
		69.0	11.9	11.4	20.0		71	51.1	51.1	S 57 Bl 43	19.19	S 57 Bl 43	18.48	S 58 Bl 42	17.61
		104.0	23.5	15.6	50.0		236	220.4	220.4	Bl 83 S 17	32.20	Bl 83 S 17	32.20	Bl 82 S 18	30.80
		69.0	24.2	20.8	80.0		252.9	220.9	220.9	Hw 68 Lw 32	61.20	Lw 52 Hw 48	37.80	Lw 100	19.80
		83.0	25.7	20.0	56.0		204.5	196.8	196.8	Fd 39 Ep 28 Cw 22 Lw 06 Pw 05	64.80	Fd 39 Ep 28 Cw 22 Lw 06 P	64.80	Fd 50 Ep 21 Cw 14 Lw 07 P	50.40
		59.0	20.8	20.5	80.0		135.8	107.7	107.7	Lw 55 Cw 36 Hw 06 Bl 04	39.60	Lw 55 Cw 36 Hw 05 Bl 04	39.60	Lw 55 Cw 35 Hw 05 Bl 05	36.00
		69.0	19.5	17.7	50.0		174.9	150.5	150.5	Bl 68 Se 26 Pl 06	26.60	Bl 68 Se 26 Pl 06	26.60	Bl 67 Se 28 Pl 05	25.20
		44.0	8.3	13.2	15.0		54.1	26.2	26.2	Bl 100	5.94	Bl 100	4.71	Bl 100	3.36
		222.0	28.2	11.6	40.1		282.7	276	276	Bl 74 Se 26	19.00	Bl 72 Se 28	18.00	Bl 71 Se 29	17.00
		104.0	27.4	17.5	70.0		364.6	342.7	342.7	Cw 44 Hw 20 Ep 12 Lw 12 Fd 08 Pw 04	45.00	Cw 41 Hw 18 Ep 14 Lw 14	39.60	Cw 35 Hw 20 Ep 15 Lw 15	36.00
		30.0	3.5	11.0	10	0	1.1	0	0	Cw 43 Bl 39 Hw 12 Se 06	26.00	Cw 46 Bl 37 Hw 13 Se 04	22.13	Cw 47 Bl 35 Hw 15 Se 03	14.98
		85.0	21.9	17.0	50	0	222.7	199.9	199.9	Cw 64 At 23 Hw 13	22.00	Cw 64 At 23 Hw 13	22.00	Cw 64 At 23 Hw 13	22.00
33.0	12.1	33.0	9.7	18.0	30	0	22.8	5.5	5.5	Cw 50 Bl 38 Hw 09 S 03	10.75	Cw 46 Bl 42 Hw 10 S 02	9.89	Bl 61 Cw 26 Hw 08 S 05	5.53

SPECIES % by BA at 17.5 cm + dbh utilization	Basal area/ha (live) 17.5 cm+ dbh utiln.	Ph II leading spp at 4cm+	Mean total age (TSL-trees)	Mean top height (TSL-trees)	Map lead spp.	Map 2nd spp.	Case # for match	Map age for match	Map ht for match	Grd age for match	Grd ht for match	October 31, 2001 compilation Live trees, clegre NEW_DWB vol/ha live -less dwb loss factors.bpSa less DWB (loss factors) 12.5	17.5
	0.00	BL	97	6.2	BL	SE	1	139.0	18.9	97	6.2	0.000	0.000
Hw 62 Se 25 Fd 13	37.33	HW	212	20.6	B	S	5	209.0	27.6	212	20.6	286.845	281.282
Pl 100	23.80	PL	74	22.1	PL		1	93.0	24.9	74	22.1	263.099	172.020
S 62 Bl 38	16.05	S			B	L	5	44.0	8.3			180.025	184.581
Fd 82 Pl 11 Ce 05 Py 02	53.20	FD	72	28.1	FD	PL	1	104.0	28.4	72	28.1	376.420	376.420
Ce 75 S 13 Pw 12	14.00	CW	146	14.6	S	L	5	99.0	25.7	146	14.6	68.837	68.837
Bl 54 S 46	18.20	BL	202	16.4	B	S	3	104.0	22.5	202	16.4	120.963	113.105
Bl 44 Ce 33 S 11 Hw 12	15.75	HW	53	10.3	H	S	3	49.0	11.6	53	10.3	157.467	131.716
Lw 38 Ce 31 Bl 25 Sx 06	44.80	CW	59	15.5	L	CW	2	74.0	25.3	59	15.5	283.984	268.960
Ce 88 S 12	96.00	CW	187	30.5	CW	S	1	249.0	34.5	187	30.5	536.683	584.385
Fd 78 Bl 11 Lw 05 Ce 03 S	51.80	FD	72	22.0	FD	L	1	69	34.7	72	22.0	452.969	430.087
Hw 40 Fd 20 Ce 20 Lw 20	8.75	CW	70	11.0	L	PL	5	73.0	28.1	70	11.0	77.208	65.920
Fd 38 Hw 38 Ce 13 Lw 11	11.20	HW	72	15.3	L	FD	5	73.0	25.0	72	15.3	125.751	89.222
Se 56 Bl 44	16.00	SE	50	17.4	S	B	3	69.0	20.8	50	17.4	92.387	92.387
Ce 36 Fd 32 Hw 24 S 08	80.00	CW	197	30.2	FD	CW	2	108.0	28.2	197	30.2	532.045	561.545
Fd 60 Ep 20 Pl 20	6.25	FD	58	24.7	AT	PL	6	79.0	21.3	58	24.7	49.250	49.250
Pl 100	19.60	PL	77	20.3	PL		1	93.0	24.9	77	20.3	211.087	136.867
Bl 100	13.33	BL	135	18.9	S	B	2	169.0	22.8	135	18.9	140.434	124.830
Se 57 Bl 43	19.60	SE	221	32.6	SE	BL	1	209.0	30.6	221	32.6	160.973	152.636
Se 54 Bl 31 Hw 08 Fd 07	23.40	BL	230	22.6	S	FD	5	99.0	28.7	230	22.6	186.029	183.936
Bl 90 Se 10	14.00	BL	145	16.3	S	B	2	169.0	24.7	145	16.3	99.888	90.997
Bl 83 Se 17	16.80	BL	168	26.3	S	B	2	169.0	20.7	168	26.3	106.199	106.199
Fd 25 Lw 25 Se 25 Bl 17 Pw	16.80	SE	68	17.3	FD	PL	5	99.0	25.4	68	17.3	109.193	118.625
Pl 50 Fd 38 S 12	8.00	PL	33	10.8	B	PL	2	84.0	17.1	33	10.8	28.120	41.111
Bl 63 Se 37	41.00	BL	174	21.5	BL	S	1	219.0	25.0	174	21.5	278.805	280.548
Bl 83 Se 17	20.00	BL	246	20.2	S	B	2	189.0	27.7	246	20.2	125.837	116.516
Bl 71 S 24 Lw 05	29.40	BL	106	24.5	B	S	1	79.0	19.9	106	24.5	284.927	281.549
Bl 100	13.23	BL	94	9.9	B	S	1	179.0	18.6	94	9.9	46.302	48.845
Ce 42 Lw 32 Bl 21 Fd 05	34.20	CW	56	20.2	L	B	5	74.0	25.3	56	20.2	288.193	227.182
Bl 71 Se 21 Pa 08	19.60	BL	176	17.1	B	S	1	209.0	26.6	176	17.1	95.989	100.144
Se 78 Bl 22	5.36	SE	61	5.1	BL	SE	2	159.0	17.0	61	5.1	51.150	50.321
Bl 53 Se 42 Pa 05	33.25	BL	143	20.7	B	S	1	189.0	21.6	143	20.7	168.812	255.460
Hw 28 Ce 22 Bl 22 S 19 Lw	57.60	HW	343	28.0	S	L	5	119.0	30.3	343	28.0	460.513	460.513
Bl 49 S 35 Pl 16	60.20	BL	131	21.2	S	B	2	209.0	24.5	131	21.2	339.961	313.744
Pl 43 Se 31 Bl 26	20.71	BL	133	22.6	S	B	2	189.0	25.7	133	22.6	136.831	148.783
Bl 68 Se 32	26.60	BL	146	23.1	S	B	2	238.0	25.4	146	23.1	252.185	232.716
Ce 35 Fd 19 Lw 13 Se 13 Bl	55.80	CW	189	23.1	L	FD	5	109.0	23.1	189	23.1	391.791	391.791
Ce 72 Fd 11 Hw 11 Lw 06	25.20	CW			H	CW	1	49.0	17.0			184.438	172.652
Bl 91 Se 09	11.00	BL	142	19.5	B	S	1	189.0	18.6	142	19.5	53.140	53.140
Bl 85 P 18 Se 17	23.80	BL	103	18.6	B	S	1	109.0	15.0	103	18.6	155.765	142.435
Ce 55 Hw 42 S 03	56.80	CW	57	21.3	H	CW	2	79.0	17.5	57	21.3	405.487	415.906
Se 80 Bl 40	18.75	BL	88	20.7	B	S	1	159.0	22.8	88	20.7	127.251	115.809
Hw 27 Lw 27 Pl 27 Ep 09 Pw	33.00	HW	99	22.6	LW	FD	5	89.0	21.7	99	22.6	348.603	258.500
Hw 50 Ce 45 Pw 05	39.60	HW	114	28.7	H	CW	3	144.0	24.9	114	28.7	339.538	340.415
Fd 63 Ce 26 Lw 11	33.25	FD	100	30.3	L	FD	2	88.0	31.9	100	30.3	252.431	300.242
Bl 100	1.16	BL	64	8.4	BL	SE	1	85.0	7.4	64	8.4	6.233	8.680
Lw 50 Fd 29 Ce 14 Hw 07	25.20	LW	70	25.8	L	FD	1	73.0	25.0	70	25.8	225.248	184.870
Bl 67 Se 33	37.80	BL	141	26.5	S	B	2	229.0	27.6	141	26.5	347.580	293.233
Fd 68 Pl 21 S 05 Pw 06	26.60	FD	74	17.9	FD	S	1	79.0	22.9	74	17.9	188.054	173.798
Bl 56 Se 44	15.75	BL	163	23.0	S	B	2	184.0	21.7	163	23.0	145.389	130.449
Bl 74 S 26	34.20	BL	116	22.3	B	S	1	103.0	22.3	116	22.3	402.080	317.036
Hw 74 S 13 Ce 09 Bl 04	41.40	HW	265	29.6	H	S	5	258.0	36.3	265	29.6	235.818	235.818
Bl 57 Se 43	14.00	BL	82	12.7	BL	SE	1	209.0	18.5	82	12.7	136.216	128.549
Ce 45 Hw 30 Se 20 Bl 05	64.00	CW	230	31.1	S	CW	2	259.0	38.5	230	31.1	396.208	396.208
Bl 50 Hw 17 Lw 17 Se 11 Fc	25.20	BL	69	18.1	L	H	5	63.0	20.2	69	18.1	188.394	170.159
Se 62 Bl 38	36.40	SE	214	26.5	B	S	2	248.0	34.3	214	26.5	324.210	313.717
Se 61 Bl 39	6.42	BL	51	9.8	B	S	1	79.0	16.7	51	9.8	59.901	57.659
	0.00	BL	77	7.3	BL	SE	1	44.0	7.0	77	7.3	37.027	0.000
Hw 68 Ce 32	39.60	HW	112	27.3	FD	H	2	89.0	27.8	112	27.3	358.334	299.066
Se 67 Bl 33	45.00	SE	276	40.8	S	B	1	209.0	37.4	276	40.8	460.918	460.918
Se 50 Bl 44 P 06	36.40	SE	273	31.3	S	B	1	238.0	27.5	273	31.3	270.525	270.525

SPECIES % by BA at 17.5 cm + dbh utilization	Basal area/ha (live) 17.5 cm+ dbh utilization	Ph II leading spp at 4cm+	Mean total age (TSL-trees)	Mean top height (TSL-trees)	Map lead spp.	Map 2nd spp.	Case # for match	Map age for match	Map ht for match	Grid age for match	Grid ht for match	October 31, 2001 compilation Live trees, clegre NEW_DWB vol*ha live -loss dwb loss factors top&s loss DWB (loss factors) 12.5	17.5
Pl 29 Lw 21 Fd 14 Hw 14 Cv	14.00	EP	69	18.9	EP	FD	1	68.0	20.9	69	18.9	140.039	128.756
Se 38 Hw 25 Fd 25 Lw 12	11.20	HW	86	14.8	H	L	1	79.0	25.1	86	14.8	116.335	91.677
Fd 59 Lw 24 Cw 17	23.80	FD	71	24.0	L	FD	2	73.0	27.2	71	24.0	248.945	181.215
Pl 43 Se 21 Fd 14 Cw 14 Ac	14.00	PL	66	17.3	FD	PL	2	84.0	22.3	66	17.3	99.936	99.936
Fd 86 Bl 14	7.00	FD	133	16.5	FD	SE	1	129.0	24.9	133	16.5	31.863	31.863
Se 100	13.56	SE	170	20.9	B	S	2	169.0	19.9	170	20.9	84.447	62.215
Bl 73 S 27	15.40	BL	115	15.1	S	BL	2	209.0	21.5	115	15.1	99.293	78.413
Bl 59 Se 29 Cw 12	17.00	BL	125.3	16.8	S	B	2	159.0	26.9	125.3	16.8	115.079	89.925
S 65 Bl 35	46.67	S	107.5	25.2	S	B	1	159.0	26.9	107.5	25.2	420.132	420.132
Se 78 Hw 20 Bl 04	31.25	SE	329.3	25.0	S	B	1	169.0	27.8	329.3	25.0	299.274	299.274
Se 45 Hw 35 Bl 15 Pw 05	48.00	SE	197.9	39.3	S	B	1	209.0	35.5	197.9	39.3	561.231	537.980
Cw 60 Fd 20 Hw 10 Lw 10	18.00	CW	108.6	30.1	FD	L	5	99.0	33.1	108.6	30.1	230.171	191.215
Hw 43 Fd 29 Ss 28	16.80	HW	66.1	16.9	H	CW	1	54.0	13.6	66.1	16.9	129.653	110.700
Fd 83 Cw 11 Py 06	32.40	FD	94.2	34.3	FD	CW	1	99.0	34.7	94.2	34.3	388.715	332.276
Lw 47 Fd 21 Se 16 Cw 11 Bl	28.60	LW	67.5	24.0	H	L	2	69.0	20.3	67.5	24.0	198.476	190.927
S 55 Bl 45	13.86	S	148.7	17.0	B	PL	5	69.0	11.9	148.7	17.0	116.585	90.262
Bl 81 S 19	29.40	BL	101.1	24.5	B	S	1	104.0	23.5	101.1	24.5	253.257	273.267
Lw 100	14.40	HW	76.2	11.4	PW	L	5	69.0	24.2	76.2	11.4	92.929	71.308
Fd 80 Cw 20 Lw 10 Pw 10	36.00	FD	76.5	27.4	FD	EP	1	83.0	25.7	76.5	27.4	291.686	323.569
Lw 60 Cw 33 Bl 07	27.00	LW	68.9	24.8	L	CW	1	59.0	20.8	68.9	24.8	219.923	177.163
Bl 65 Se 29 Pl 06	23.80	BL	102.8	22.0	B	PL	1	69.0	19.5	102.8	22.0	221.652	208.007
	0.00	BL	57.6	5.6	BL		1	44.0	8.3	57.6	5.6	25.335	0.000
Bl 71 Se 29	17.00	BL	199.4	42.4	BL	S	1	222.0	28.2	199.4	42.4	125.540	125.540
Cw 33 Ep 17 Hw 17 Lw 17 F	32.40	CW	79.7	27.8	H	FD	5	104.0	27.4	79.7	27.8	178.008	224.388
Cw 50 Bl 33 Hw 17	10.63	CW			BL	SE	5	30.0	3.5			55.119	70.078
Cw 60 At 25 Hw 15	20.00	CW	95.1	20.3	CW	EP	1	85.0	21.9	95.1	20.3	101.437	100.612
Bl 100	3.04	CW	42.54	7.2	HW	CW	2	33.0	12.1	42.54	7.2	30.277	22.786